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U.S. Department of Agriculture

X
1966 BUDGET

EXPLANATORY NOTES

FOREST SERVICE

PREFACE

Project Statements -

The obligations shown in the project statements are on the basis of the appropriations and activities proposed in the 1966 Budget Estimates. In some project statements, the activities are further divided into subcategories, reflecting a more detailed description of the work conducted under the appropriation items.

Obligations reflected as subcategories in the project statements, while generally obtained from accounting records, in some instances represent the best approximation available. Wherever it has been necessary to distribute costs to activities for which total amounts cannot be taken directly from the accounts, every effort has been made to allocate such charges as accurately as possible based on other available information such as past experience, special studies, cost analyses, etc.

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FOREST SERVICE

Purpose Statement

The Forest Service was established February 1, 1905, pursuant to the Transfer Act of February 1, 1905, which provided for the transfer of the forest reserves from the Department of the Interior to the Department of Agriculture. Forest Reserves and the Bureau of Forestry were established by other acts prior to the Transfer Act. By the Act of March 4, 1907, the name "Forest Reserves" was changed to "National Forests" and the latter name has been used since that time.

The Forest Service is responsible for promoting the conservation and wise use of the country's forest and related watershed lands, which comprise one-third of the total land area of the United States. To meet its responsibility the Forest Service engages in three main lines of work, as follows:

1. Management, protection, and development of the National Forests and National Grasslands. The 186 million acres of National Forests and National Grasslands are managed under multiple use and for sustained yield. Under these principles natural resources of outdoor recreation, range, timber, watershed, and wildlife are utilized in a planned combination that will best meet the needs of the Nation without impairing the productivity of the land. These management and utilization principles were recognized in the Multiple Use-Sustained Yield Act of June 12, 1960 (74 Stat. 215).

In managing the National Forests, technical forestry is applied to the growing and harvesting of timber crops. Grazing use is managed to obtain proper range conservation along with utilization of the annual growth of forage. Watersheds are managed to regulate stream flow, prevent floods, and provide water for power, irrigation, navigation, and municipalities. Management includes the handling of 135 million visits of people to the National Forests for recreation purposes. Wildlife habitat is managed to provide a suitable land and water environment for both game and non-game wildlife.

Under the multiple use principles ~~most~~ areas are used for, or serve, more than one purpose or objective. For example, about 50% of the area within the National Forests serves five different purposes: (1) timber production, (2) watershed protection, (3) forage production, (4) wildlife production, and (5) recreation. An additional 28% serves four purposes in varying combinations. Of the remainder, 21% of the total serves three purposes with only 1% of the total reserved exclusively for a single purpose, mainly campgrounds and special use areas, such as summer homesites, pastures, corrals, etc. The varied interests which frequently conflict and which must be reconciled, and the vast areas covered, clearly require careful planning and skillful management of the National Forest properties.

Gross area within unit boundaries encompasses about 226 million acres in 44 States and Puerto Rico, of which some 186 million acres are under Forest Service administration. Protection from fire and trespass is made difficult by the large area to be protected, the general inaccessibility, the many thousands of miles of exterior boundary, the intermingled public and

private land, the impossibility of taking preventive action with such a problem as lightning-caused fires, and the rapidly increasing public utilization of these lands and their associated resources.

The protection of the National Forests includes the control of forest fires, the control of tree disease and insect epidemics, and the prevention of trespass.

The major development activities of the National Forests are reforestation; timber stand improvement; revegetation; construction of roads, recreational facilities, range and other necessary improvements; and land acquisition and exchanges.

The economic importance of the National Forests and National Grasslands is evident when it is considered that:

- a. They produced a cash income in the fiscal year 1964 of over \$137.5 million. The following table summarizes cash receipts:

<u>Class of receipts</u>	<u>1963 Actual</u>	<u>1964 Actual</u>	<u>1965 Estimated</u>	<u>1966 Estimated</u>
Timber sales	\$117,387,497	\$127,959,538	\$130,300,000	\$132,700,000
Grazing	3,385,978	3,181,940	3,300,000	3,400,000
Land uses	3,738,160	4,580,180	4,800,000	5,000,000
National grasslands	1,712,565	1,792,840	1,800,000	1,850,000
Total receipts ..	<u>126,224,200</u>	<u>137,514,498</u>	<u>140,200,000</u>	<u>142,950,000</u>

Above amounts include:

Suspense account,

Alaska a/ (820,828) (915,812) (925,000) (925,000)

Suspense account,

O&C Lands b/ (4,341,916) (4,154,700) (4,000,000) (4,000,000)

Approximately 65% of this amount is credited to the general fund in the Federal Treasury (miscellaneous receipts). The remainder is distributed in accordance with special acts of Congress, including 25% to the States or counties in which lands are located, and 10% made available for construction and maintenance of the Forest Service system of roads and trails. In addition to these cash receipts, there are the even greater economic values which result from the processing of end products derived from this utilization of National Forest timber, forage, minerals, etc. There are also the important values of water, recreation, and wildlife which cannot be readily expressed in monetary terms.

a/ Account established pending settlement of Indian rights on Tongass National Forest, Alaska.

b/ Account established for Oregon and California railroad grant lands, for which receipts are transferred to Department of the Interior for distribution under the Acts of August 28, 1937, June 24, 1954, and August 3, 1961 (43 U.S.C. 1181f-g).

b. The area within National Forests boundaries is equivalent to some 10% of the area of the continental United States. Over 40% of this land is within areas now experiencing severe economic distress. Proper management, development, and utilization of these lands are important factors in permanent improvement of these local economies. Millions of people who live in and near the National Forests are supported in whole or in part through the economic development arising from the forests and their resources.

c. The National Forests supplied 11 billion board feet of timber in fiscal year 1964 to the Nation's forest products industries. This is expected to increase to 11.2 billion board feet in 1965. Dependence of the forest products industries on National Forest timber continues to increase as the result of depletion of good quality timber on private lands.

d. About 6 million head of domestic livestock (including calves and lambs) are grazed on the National Forests and Grasslands.

e. These lands provide protection to municipal water supplies for nearly all western cities and towns and many in the east, to irrigation water used on about 20 million acres of western lands, and to many streams with water power developments. They provide flood protection to thousands of acres of rich valley lands and help to prevent more rapid siltation of reservoirs and stream channels.

f. They provide a habitat for a large part of the big game animal population, for birds, for millions of small game animals and furbearers, and for fish.

g. They provide opportunities for healthful outdoor recreation, with a minimum of restrictions, for millions of people who yearly visit the National Forests.

2. Forestry research. The Forest Service conducts research in the entire field of forestry and the management of forest and related ranges. This includes the growth and harvesting of timber, its protection from fire, insects, and diseases, the protection and management of watersheds, and improved methods for development and management of recreation resources. It conducts studies in forest economics, marketing of forest products, and a survey of the present extent and potential growth and use of the Nation's forest resources. It also conducts research to develop new and improved products from wood, to increase efficiency of utilizing forest products, and to advance the efficiency and mechanization of forestry operations. Results of research are made available to owners of private forest and range lands, to public agencies which administer such lands, to forest products industries, and to consumers. The program has a two-fold objective: (1) to backstop the National Forest development program by devising more efficient practices for protecting, managing, and utilizing forest resources; and (2) to develop new and improved practices that will lead to sounder uses of forests in other public and private ownerships and more efficient and profitable utilization and marketing of forest products.

The Forest Service also cooperates with the Agricultural Research Service of the Department by reviewing and appraising for technical adequacy forest research projects beneficial to the United States which are conducted abroad. These projects are carried out with foreign currencies under Section 104(k) of Public Law 480, as amended, and the dollar expenses of the Forest Service in connection with this work are paid from the appropriation "Forest Protection and Utilization."

3. Cooperation with State and private forest landowners. The Forest Service cooperates with State agencies and private forest owners to (a) better protect the 440 million acres of State and privately owned forests and critical watersheds against fire, insects, and diseases; (b) encourage better forest practices, both for resource conservation and profit, on the 358 million acres of private forest land; (c) aid in the distribution of planting stock for forests, shelterbelts, and wood lots; (d) stimulate development and proper management of State, county and community forests.

The Forest Service is also responsible for carrying out the provisions of Section 401 of the Agricultural Act of 1956 (16 U.S.C. 568e), by providing assistance to the State Forester or equivalent State official, through advice, technical assistance, and financial contributions for increased tree planting and reforestation work in accordance with plans submitted by the State and approved by the Secretary of Agriculture.

Proper administration, protection, and development of these forest resources is essential as they must be so managed as to yield the maximum resource potential. In many rural areas, the forestry resource is the key to the establishment and maintenance of sound local economies. The State and private forestry programs of the Forest Service are a vital part of the Department of Agriculture's overall rural area development program.

Other work related to forestry includes:

4. Insect and disease control. Activities to suppress and control destructive insects and diseases that threaten timber areas include two types of work carried on jointly by Federal, State, and private agencies: (a) Surveys on forest lands to detect and evaluate infestations of forest insects and infections of tree diseases and determination of protective measures to be taken, and (b) control operations to suppress or eradicate forest insects and diseases, including white pine blister rust.
5. Flood prevention and watershed protection. On National Forest lands and on non-Federal forest lands within the watersheds authorized for treatment by the Department of Agriculture under the Flood Control Act of December 22, 1944, the Forest Service plans and installs watershed improvement measures, in the form of minor physical structures, cultural measures, and intensified fire control, to retard runoff and reduce flood water and sediment damage. Work on non-Federal land is carried on in cooperation with the Soil Conservation Service and the appropriate State and local agencies.

The Forest Service also cooperates with the Soil Conservation Service, appropriate State agencies and the local organizations sponsoring small watershed protection and flood prevention projects initiated under the Watershed Protection and Flood Prevention Act of 1954, as amended, in planning and installing forestry and related measures on the watersheds and in inter-agency studies of proposed water and land resource developments on river basins for the purpose of obtaining integrated resources development programs.

6. Work performed for others. The Forest Service is frequently called upon to perform services for other Federal, State, or private agencies on a reimbursable or advance payment basis. Examples of these activities are:
 - a. Protection of other Federal and non-Federal forest lands intermingled with the National Forests.
 - b. Disposal of slash resulting from sales of timber and the rehabilitation of such areas.
 - c. Construction and maintenance of roads, and other improvements.
 - d. Research investigations in forest, range, and water management and utilization problems.
 - e. Cooperative survey, mapping, administrative, and reforestation projects, etc.
 - f. Cooperation with defense and mobilization agencies on forest production and utilization projects, and related work.
 - g. Acquire lands for outdoor recreation purposes under the Land and Water Conservation Fund Act.
 - h. Construct, equip, and operate Job Corps centers to carry out part of the youth ~~program~~ authorized by the Economic Opportunity Act.
7. Rural fire defense. The Forest Service, as a part of its regular programs, also directs Federal activities and provides technical guidance and training to States concerned with the prevention and control of fires which might be caused by an enemy attack in rural areas of the United States.

The Forest Service maintains its central office in Washington, with program activities decentralized to 10 Regional Offices, 130 Forest Supervisors' offices, 823 District Rangers' offices 10 Forest and Range Experiment Stations, the Institute of Tropical Forestry, and the Forest Products Laboratory.

Summary of Estimated Appropriations and Receipts, 1965 and 1966

	Estimated Available 1965	Budget Estimates 1966	Increase (+) or Decrease (-)
<u>Appropriations</u>			
Forest protection and utilization:			
Forest land management	a/ \$153,499,000	\$162,378,000	+\$8,879,000
Forest research	34,285,000	32,554,000	-1,731,000
State and private forestry cooperation	17,013,000	17,513,000	+500,000
Total, Forest protection and utilization	b/ 204,797,000	212,445,000	+7,648,000
Forest roads and trails	a/ 71,472,000	78,672,000	+7,200,000
Acquisition of lands for National Forests, Special Acts	70,000	70,000	- -
Acquisition of lands for Wasatch National Forest	150,000	- -	-150,000
Cooperative range improvements	700,000	700,000	- -
Assistance to States for tree planting	a/ 1,000,000	1,000,000	- -
Expenses, brush disposal (per- manent)	9,500,000	9,500,000	- -
Roads and trails for States (permanent)	13,141,263	13,400,000	+258,737
Forest fire prevention (permanent). a/	25,000	30,000	+5,000
Restoration of forest lands and improvements (permanent)	a/ 100,000	100,000	- -
Payment to Minnesota (permanent) ..	137,763	138,000	+237
Payments to counties, National Grasslands (permanent)	450,000	450,000	- -
Payments to school funds, Arizona and New Mexico (permanent)	108,205	110,000	+1,795
Payments to States, National For- ests fund (permanent)	32,837,416	33,540,000	+702,584
Total	334,488,647	350,155,000	+15,666,353
Deduct permanent appropriations shown in detail above)	56,299,647	57,268,000	968,353
Total, (excluding permanent ap- propriations)	278,189,000	292,887,000	14,698,000
<u>Receipts</u>			
Forest resource utilization	140,200,000	142,950,000	+2,750,000

a/ In addition, prior year balances are available.

b/ Exclusive of \$411,000 transferred to General Services Administration.

FOREST PROTECTION AND UTILIZATION

Proposed Change in Activity Structure

Present Structure (1965 Budget)		Proposed Structure
FOREST PROTECTION AND UTILIZATION	:	FOREST PROTECTION AND UTILIZATION
1. Forest land management	:	1. Forest land management
(a) National forest protection and management	:	(a) National forest protection and management
(b) Fighting forest fires	:	(b) Water resource development related activities
(c) Insect and disease control	:	(c) Fighting forest fires
(d) Acquisition of lands	:	(d) Insect and disease control
	:	(e) Acquisition of lands

Explanation of Need for Additional Activity

The unprecedented increase in planning and construction of water resource developments requires a corresponding increase of activity by the Forest Service which is substantially beyond that provided for in the Development Program for the National Forests. The decision to construct these reservoir projects, with their resulting impact on National Forest land both in terms of timing and location, is made by other agencies and organizations rather than the Forest Service. These would include hydro electric, reclamation, irrigation, flood control and similar installations by State, private and other Federal agencies.

In prior years National Forest responsibilities related to water resource development such as impact surveys, construction liaison, and reservoir associated public access, use and management facilities were financed from funds appropriated for a variety of activities such as "Recreation-public use" and "Soil and water management." These water resource developments involve land management activities normally conducted by the Forest Service. Participation in this work has been limited to those tasks which could not be postponed. It fell far short of the needed level of participation to achieve the objectives of water resource development within the National Forest multiple use environment.

The Bureau of the Budget requested the land managing agency to request funds for reservoir associated cost in their agency budget rather than through the construction agency budget. Therefore, a separate activity is proposed to implement that decision and to provide the funds required for impact surveys, construction liaison, and public access, use and management facilities required because of the reservoir projects on a time and intensity level which permits a fully coordinated planning and development of water and related land resource projects associated with National Forest system lands.

Project items have been adjusted as shown below to reflect the proposed change.

	<u>1964</u>	<u>1965</u>	<u>1966</u>
	(Thousands of Dollars)		
FOREST PROTECTION AND UTILIZATION			
<u>Forest Land Management</u>			
National Forest Protection and management:			
Recreation-Public Use	-1,094	-1,231	- -
Soil and Water Management	-606	-656	- -
 <u>Water Resource Development:</u>			
Related Activities	1,700	1,387	4,532

(a) Forest Protection and Utilization

	<u>Forest Land Management</u>	<u>Forest Research</u>	<u>State & Private Forestry Cooperation</u>	<u>Total</u>
Appropriation Act, 1965	a/ \$150,744,000	b/ \$33,585,000	\$16,955,000	c/ \$201,284,000
Transferred to "Operating Expenses, Public Buildings Service, General Services Administra- tion" for space rental	-407,000	-4,000		-411,000
Proposed supplemental, 1965, for increased pay costs	+3,162,000	+704,000	+58,000	+3,924,000
Base for 1966	c/ 153,499,000	34,285,000	17,013,000	c/ 204,797,000
Budget Estimate, 1966	c/ 162,378,000	32,554,000	17,513,000	c/ 212,445,000
Increase or decrease	+8,879,000	-1,731,000	+500,000	+7,648,000

a/ Includes \$800,000 appropriated in the Supplemental Appropriation Act, 1965.

b/ Includes \$1,900,000 supplemental appropriation appropriated in the Department of Agriculture and Related Agencies Appropriation Act, 1965.

c/ In addition, \$700,000 is available by transfer from "Cooperative Range Improve-
ments."

SUMMARY OF INCREASES AND DECREASES

	<u>1965 Available</u>	<u>Increase or Decrease</u>	<u>1966 Estimate</u>
<u>Forest Land Management:</u>			
Timber sales administration and manage- ment to increase volume of timber cut and sold	\$30,097,000	+\$165,000	\$30,262,000
Accelerate rate of reforestation	16,876,000	+615,000	17,491,000
Operation, maintenance and developments of recreation areas and facilities	25,410,000	+2,100,000	27,510,000
Conduct hydrologic surveys and prepare plans of management to increase quality of water yield, etc.	5,146,000	+1,000,000	6,146,000
Increase verification, recovery and mon- umentation of property corners	4,012,000	+500,000	4,512,000
Additional payments to Employees ¹ Compensation Fund	615,000	+54,000	669,000
Meet costs associated with water develop- ment projects built by other agencies .	1,887,000	+2,645,000	4,532,000
Meet increased costs of applying and monitoring non-persistent pesticides ..	7,135,000	+1,800,000	8,935,000
All other	62,321,000	-	62,321,000
Total, Forest land management	153,499,000	+8,879,000	162,378,000

SUMMARY OF INCREASES AND DECREASES -- Continued

	1965 <u>Available</u>	Increase or <u>Decrease</u>	1966 <u>Estimate</u>
<u>Forest Research:</u>			
For forest fire research to strengthen basic laboratory research that will provide new knowledge fundamental to development of fire prevention and control techniques	1,897,000	+350,000	2,247,000
For forest products utilization research to improve performance of wood and improve basis for determining wood quality	5,401,000	+489,000	5,890,000
For investigations aimed at expanding and strengthening markets for timber products	1,139,000	+325,000	1,464,000
Reduction in timber management research due to closure of projects in New Jersey, Indiana, and California	7,687,000	-141,000	7,546,000
Reduction in watershed management research due to closure of one project	3,151,000	-21,000	3,130,000
Reduction in range management research due to closure of one project in South-west	1,240,000	-50,000	1,190,000
Reduction for nonrecurring forest research construction projects	4,001,000	-2,683,000	1,318,000
All other	9,769,000	- -	9,769,000
Total, Forest research	<u>34,285,000</u>	<u>-1,731,000</u>	<u>32,554,000</u>
<u>State and Private Forestry Cooperation:</u>			
For cooperation in forest management and processing to provide technical assistance to additional small private forest owners, loggers, sawmill and processing plant operators	3,027,000	+500,000	3,527,000
All other	13,986,000	- -	13,986,000
Total State and private forestry cooperation	<u>17,013,000</u>	<u>+500,000</u>	<u>17,513,000</u>
TOTAL, Forest Protection and Utilization .	<u>204,797,000</u>	<u>+7,648,000</u>	<u>212,445,000</u>

PROJECT STATEMENT

Project	1964	1965 (estimated)	Increases and Decreases	1966 (estimated)
FOREST LAND MANAGEMENT:				
National Forest Protection and Management:				
(1) Timber resource management:				
(a) Sales administration and management	\$28,611,018	\$30,097,000	+\$165,000	\$30,262,000
(b) Reforestation and stand improvement	14,587,233	16,876,000	+615,000	17,491,000
(2) Recreation-public use	24,959,256	25,410,000	+2,100,000	27,510,000
(3) Wildlife habitat management	3,130,458	3,808,000	- -	3,808,000
(4) Range resource management:				
(a) Management	5,207,985	5,254,000	- -	5,254,000
(b) Revegetation	2,560,620	2,780,000	- -	2,780,000
(c) Improvements	3,174,098	3,339,000	- -	3,339,000
(5) Soil and water management.	4,342,057	5,146,000	+1,000,000	6,146,000
(6) Mineral claims leases, and special uses	3,782,594	3,904,000	- -	3,904,000
(7) Land Classification, adjustments, and surveys	4,170,372	4,012,000	b/ +500,000	4,512,000
(8) Forest fire protection ...	20,880,637	23,564,000	- -	23,564,000
(9) Structural improvements for fire and general purposes (construction and maintenance):a/	13,099,406	11,052,000	- -	11,052,000
(10) Payments to Employees' Compensation Fund	519,655	615,000	+54,000	669,000
Subtotal	129,025,389	135,857,000	+4,434,000	140,291,000
Amount advanced from "Cooperative Range Improvements"	-700,000	-700,000	- -	-700,000
Subtotal, National Forest protection and management	128,325,389	135,157,000	+4,434,000	139,591,000
(11) Water resource development related activities	1,700,000	1,887,000	+2,645,000	4,532,000
(12) Fighting forest fires	17,416,958	5,000,000	- -	5,000,000
(13) Insect and disease control:				
(a) White pine blister rust control	3,417,167	c/ 3,640,000	- -	c/ 3,640,000
(b) Other pest control	6,855,148	d/ 7,135,000	+1,800,000	d/ 8,935,000
Subtotal, Insect and disease control	e/ 10,272,315	10,775,000	+1,800,000	12,575,000
(14) Acquisition of Lands (Weeks Act)	960,780	680,000	- -	680,000
Total, Forest Land Management .	a/158,675,442	153,499,000	+8,879,000	162,378,000

(continued on next page)

Project	1964	1965 (estimated)	Increases and Decreases	1966 (estimate)
FOREST RESEARCH:				
<u>Forest and range management research:</u>				
(15) Timber management research:	6,540,517:	7,687,000:	-141,000:	7,546,000:
(16) Watershed management research	2,654,275:	3,151,000:	-21,000:	3,130,000:
(17) Range management research :	1,114,587:	1,240,000:	-50,000:	1,190,000:
(18) Wildlife habitat research :	605,038:	691,000:	- -:	691,000:
(19) Forest recreation research	409,551:	432,000:	- -:	432,000:
Subtotal, Forest and range management research	11,323,968:	13,201,000:	-212,000:	12,989,000:
<u>Forest protection research:</u>				
(20) Forest fire research	1,754,559:	1,897,000:	+350,000:	2,247,000:
(21) Forest insect research ..	2,036,533:	3,735,000:	- -:	3,735,000:
(22) Forest disease research .	1,702,947:	2,043,000:	- -:	2,043,000:
Subtotal, Forest protection research	5,494,039:	7,675,000:	+350,000:	8,025,000:
<u>Forest products and engineering research:</u>				
(23) Forest products utilization research	4,887,694:	5,401,000:	+489,000:	5,890,000:
(24) Forest engineering research	262,359:	409,000:	- -:	409,000:
Subtotal, Forest products and engineering research	5,150,053:	5,810,000:	+489,000:	6,299,000:
<u>Forest resource economics research:</u>				
(25) Forest survey	1,602,086:	1,903,000:	- -:	1,903,000:
(26) Forest products marketing research	829,258:	1,139,000:	+325,000:	1,464,000:
(27) Forest economics research	564,714:	556,000:	- -:	556,000:
Subtotal, Forest resource economics research	2,996,058:	3,598,000:	+325,000:	3,923,000:
(28) Forest research construction	717,558:	4,001,000:	-2,683,000:	1,318,000:
Total, Forest Research	25,681,676:	34,285,000:	-1,731,000:	32,554,000:

Project	1964	1965 (estimated)	Increases and Decreases	1966 (estimated)
STATE AND PRIVATE FORESTRY COOPERATION:				
(29) Cooperation in forest fire control	12,464,509	12,783,000	- -	12,783,000
(30) Cooperation in forest tree planting	297,515	300,000	- -	300,000
(31) Cooperation in forest management and processing	2,508,140	3,027,000	+500,000	3,527,000
(32) General forestry assistance	585,812	903,000	- -	903,000
Total, State and Private Forestry Cooperation	15,855,976	17,013,000	+500,000	17,513,000
Total, Forest Protection and Utilization	f/200,213,094	204,797,000	+7,648,000	212,445,000
Unobligated balance lapsing	1,833,024	- -	- -	- -
Total increased pay costs (PL 88-426)	(- -)	(5,078,000)	(+260,000)	(5,338,000)
Total available or estimate	202,046,118	204,797,000	+7,648,000	212,445,000

a/ Includes \$650,000 provided by Deficiency Appropriation Act, PL 88-317, approved June 9, 1964, for: Recreation-Public Use, \$100,000; Structural Improvements for Fire and General Purposes, \$550,000. These amounts will be obligated in fiscal year 1965.

b/ To be allocated to the Department of the Interior.

c/ Includes allocation to the Department of the Interior: 1965, \$352,000; 1966, \$346,000.

d/ Includes allocation to the Department of the Interior: 1965, \$919,000; 1966, \$730,000.

e/ Excludes obligations of \$1,672,261 incurred in 1964 against funds provided by Supplemental Appropriation, PL 88-25, approved May 17, 1963. Summary follows:

Obligations, fiscal year 1963	\$1,284,336
Obligations, fiscal year 1964	1,672,261
Unobligated balance lapsing	43,403
Total appropriated	\$3,000,000

f/ Represents obligations as follows:

Obligated FY 1964 (excluding \$414,373 comparative transfer)	199,563,094
Estimated obligations, FY 1965, per a/above	650,000

JUSTIFICATIONS OF 1966 ESTIMATES

(1) Timber Resource Management

(a) Sales administration and management \$30,262,000

A program increase of \$165,000 is proposed for fiscal year 1966. This will permit the harvest of an estimated 11.4 billion board feet of National Forest timber, an increase of 200 million board feet over fiscal year 1965. The volume planned for sale is 12.0 billion board feet.

An increasingly larger proportion of the total industrial roundwood produced in the United States comes from the National Forests. If the present trend continues, National Forests will be supplying nearly one-fourth of the total industrial roundwood produced in the United States and nearly one-third of the total sawtimber production in fiscal year 1966, compared to about 20% and 28%, respectively, in 1963. The National Forests are capable of meeting these needs in accordance with sound forest management principles and within sustained-yield capacity.

The Forest Service goal is to provide for these increasing needs by offering timber for sale at the full allowable cut rates wherever practicable. This goal must be achieved to keep mills going, provide employment, and contribute substantially to the general economy.

In response to strong demands from timber purchasers and the forest products trade associations, work has been underway with an industry committee on a complete reorganization of the contract terms for the sale of National Forest timber. This project was started in November 1963. It is now approaching completion. The new contract form and procedures are scheduled to be put into use at the beginning of fiscal year 1966.

A complete review and revision of contractual relationships and procedures of contract administration have been made. Timber purchasers insist that many difficulties have developed because of the contractual relationships established by the present Forest Service contract form. Necessarily a contract which permits a purchaser, in using his right to cut standing timber, to build roads, to fell trees and to drag them from the stump to a roadside loading point, must contain detailed performance specifications and safeguards to insure protection of residual timberstands and other National Forest uses and values and to provide for forest regeneration and erosion control. The system used in the present contract is to require performance by timber purchasers as directed by the Forest Service. With the cost-price squeeze which most timber purchasers are experiencing, this subjective system is now highly objectionable to the forest products industry.

The new contract provides for objective standards of performance of the logging process and the observance of precautions against unnecessary disturbance of vegetation, soil and water, and the installation of

Project (1-a)

corrective measures. Timber sale administration under this form of contractual relationship requires many more estimates of work quantities to be done in connection with these required procedures and much more careful observation and supervision to obtain performance to the established objective standards as compared to present procedures with purchasers obligated, within broad guidelines, to perform to the satisfaction of the Forest Service.

The new contract form also provides for amortization of the roads a purchaser must build for timber removal through a system under which payment rates for timber are those appropriate as if such roads were in place. The estimated cost of the roads the purchaser builds is considered the equivalent of a payment for stumpage. There are material advantages in this new method both to the Government and the timber purchaser. Administration of this procedure will require closer inspection of road construction progress, including monthly estimates of work completed, than has been needed under present contract procedures.

There is a major task in training and indoctrination of the Forest Service timber sale personnel in the use of and procedures under the new contract. The requested program increase will be used to cover part of the costs of the additional training needed to implement the new contract. These additional costs have been included in the following estimates for the total program for fiscal year 1966:

Sale preparation 12.0 billion board feet	
@ \$0.69 per M	\$8,300,000
Sale administration 11.4 billion board feet	
@ \$1.77 per M	20,160,000
Advance sale preparation 1.5 billion board feet	
@ \$0.20 per M	300,000
Timber inventories and management plans	<u>1,502,000</u>
TOTAL	\$30,262,000

Examples of Recent Accomplishment

Sales Administration. An all-time record volume of 11.0 billion board feet of timber was harvested from the National Forests in fiscal year 1964. The previous record set in fiscal year 1963 was exceeded by 1.0 billion board feet. Receipts from the record timber harvest amounted to \$128.0 million, an increase of \$10.6 million over fiscal year 1963. A total of 12.2 billion board feet of timber was offered for sale during fiscal year 1964. Of this amount, 11.7 billion board feet was sold. Bids were not received on the remaining 500 million board feet. The volume actually sold amounted to 98% of the allowable annual cut of the National Forests. (See Figure A-1.)

The Forest Service continues to seek ways of increasing efficiency and reducing costs of sale administration. Modern techniques for determining

log volume are being developed and installed. (See Figure A-2.) The National Forest Log Scaling Handbook has been completely revised to take advantage of the latest log scaling techniques. This Handbook has been made available to the general public through the Superintendent of Documents.

The major portion of the 2.1 billion board feet of National Forest timber windthrown and damaged by hurricane force winds on Columbus Day 1962 in Oregon and Washington has been successfully salvaged. Continuing effort is being made to salvage the few remaining small scattered pockets of damaged timber.

Progress in meeting the sustained-yield allowable cut objectives during the past five years and the estimates for fiscal year 1965 are shown in the following table:

(Volumes in Billions of Board Feet)

<u>Fiscal Year</u>	<u>Annual Allowable Cut 1/</u>	<u>Actual Volume Cut</u>	<u>Percent of Allowable Cut Harvested</u>	<u>Actual Volume Sold</u>	<u>Percent of Allowable Cut Sold</u>
1960	10.0	9.4	94	12.2	122
1961	10.4	8.4	81	8.9	86
1962	10.5	9.0	86	10.3	98
1963	11.3	10.0	88	12.2	108
1964	12.0	11.0	92	11.7	98
1965(Est.)	(12.0)	(11.2)	(93)	(12.0)	(100)

1/ As of January 1 preceding the fiscal year. Annual allowable cut includes only sawtimber for National Forests west of the Great Plains and in Alaska, and sawtimber and convertible products for National Forests in the eastern half of the United States.

Timber inventories and management plans are designed to organize each major management unit (working circle) into an array of timberstand ages and conditions which will insure continuous and relatively uniform annual production of commercially valuable timber. This must be done without damage to soil and waterflow and in harmony with other forest resources and uses. (See Figure A-3.) Because of changing inventories and economic and forest area conditions, the timber management plan for each working circle is revised at approximately decade intervals. In fiscal year 1964, revised plans were approved for an additional 7,041,000 acres. With the exception of one of the ten Regions, the planning backlog has been eliminated and work is on a routine basis.

A major Forest Service manual revision of timber management planning instructions was completed. The standardization of inventory sampling between Regions and with the National Forest Survey was completed.

TIMBER RESOURCE MANAGEMENT

COMPARISON OF ANNUAL ALLOWABLE CUT AND ACTUAL VOLUME HARVESTED 1956 - 1966

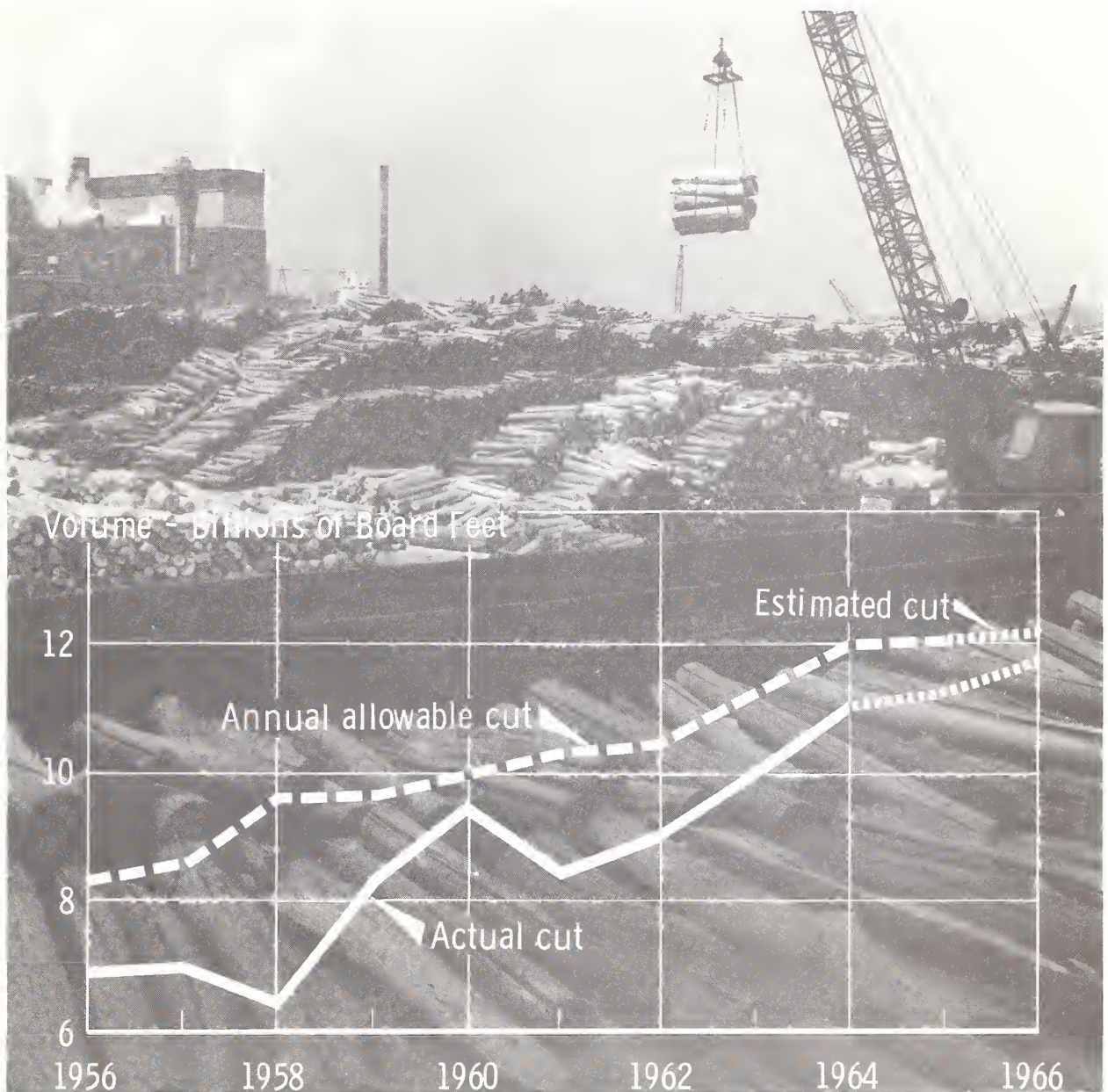
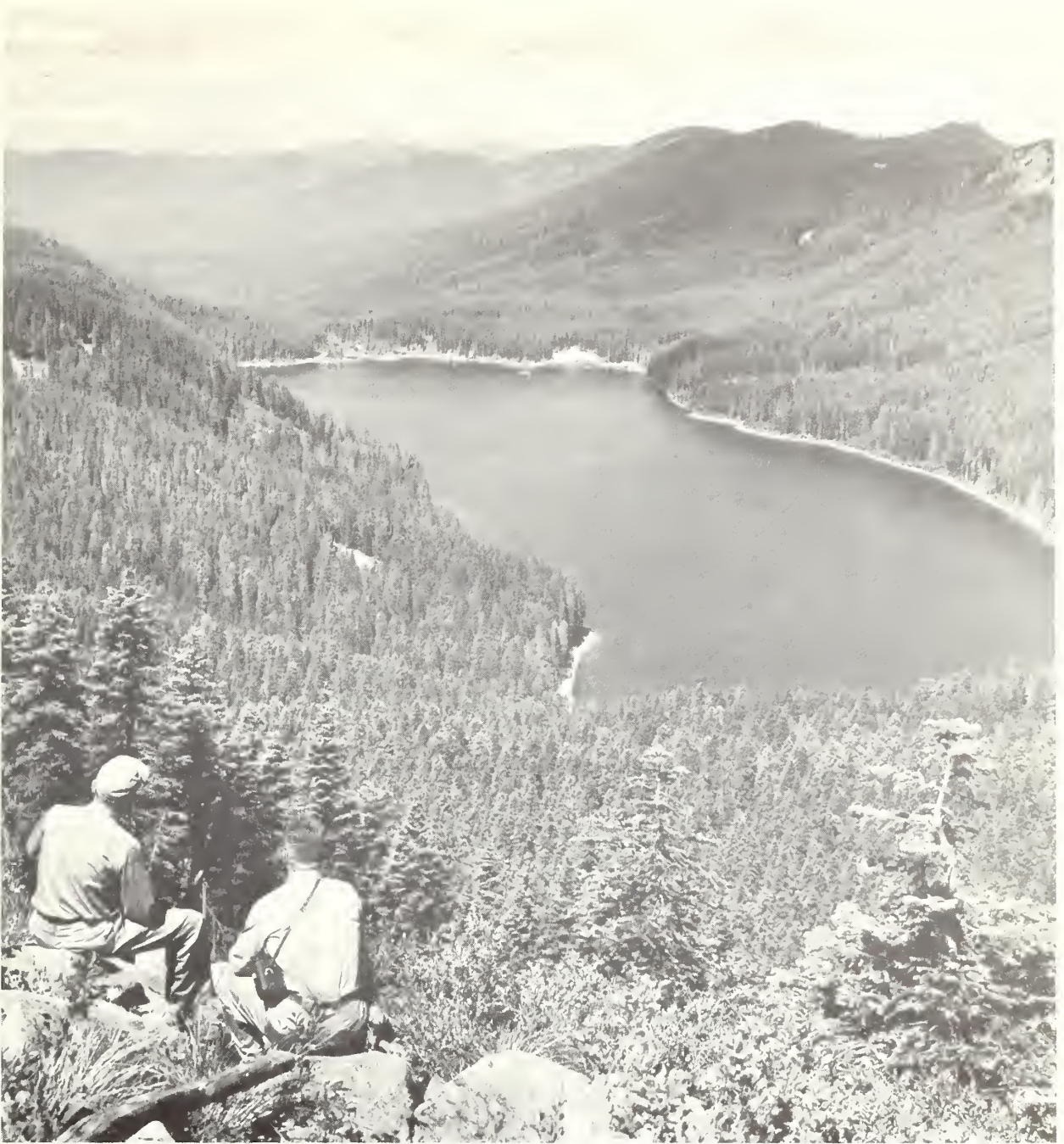


Figure A - 1



Advantage is taken of modern methods to improve efficiency and reduce costs both to the Forest Service and to timber purchasers. Here, a load of lodgepole pine logs is weighed on a modern, self-printing scale. Weights are readily converted to net board foot volumes and load delay times are minimized.

Figure A-2



This heavily timbered watershed furnishes the domestic water supply for one of our major cities. Complex decisions for using such areas must be made and incorporated into timber management plans so that future harvesting and other timber activities will be in harmony with as well as enhance water production and other resource values and uses.

Figure A-3

(b) Reforestation and Stand Improvement \$17,491,000

An increase of \$615,000 would be used to make needed progress on reforesting nonstocked timberland by tree planting on the National Forests.

There were approximately 4.4 million acres of nonstocked and poorly stocked timberland in the National Forests as of 1962. It was determined at that time from projection of timber growth and timber use that 3.8 million acres of this land should be reforested and timber stand improvement should be completed on 10 million acres of young growth by 1972. This rate of accomplishment is needed on the National Forests to help maintain continued production of the country's total annual requirements for industrial wood. The level of timber harvesting on the National Forests and the maintenance of thrifty growth in forest stands are dependent on timely reforestation and timber stand improvement operations. Genetically improved tree seed also contributes to increased timber growth and better timber quality.

Accomplishments, completed and scheduled for the period 1963-1966, are considerably short of meeting the above stated 10-year objectives (Figure B-2). The \$615,000 increase for 1966 provides for an increase of 10,000 acres of tree planting. This is offset by a 10,000 acre decrease in seeding to result in no increase in the total area of reforestation. The entire appropriation increase will be used for the higher cost tree planting program to utilize trees in nurseries that otherwise would have to be destroyed. Trees for the 1966 planting program were started in nurseries two and three years ago in anticipation of an expanding reforestation program. Areas requiring planting cannot be successfully reforested by seeding; therefore, seeding and planting programs must be planned separately. Continued progress at the 1965 level of accomplishment will require thirty more years to complete the planned 10-year program.

Summary of total program proposed for fiscal year 1966 --

Reforest 151,000 acres of potentially productive commercial forest land including cost of seed and trees, site preparation, and other requisite operations	\$11,120,000
Develop and improve tree nurseries at ten locations and seed orchards and tree production areas at 240 locations ..	1,400,000
Release and weed, thin or otherwise improve conditions for future timber growth on 200,000 acres of young timber stands	<u>4,971,000</u>
Total	\$17,491,000

Examples of Recent Accomplishments

Reforestation. 108,191 acres of National Forest land were reforested with appropriated funds (104,938 acres) and APW funds (3,253 acres) in fiscal

Project (1-b)

year 1964. 90,730 acres were planted, 14,392 acres were seeded, and 3,069 acres were regenerated by natural seed fall on land specially prepared to take the seed. Site preparation was completed on 146,876 acres. This latter operation is necessary to remove brush and other vegetation that prevent establishment of forest trees. (See Figure B-3.)

Other reforestation accomplishments include procurement of 79,836 pounds of tree seed (30,115 pounds by purchase from seed dealers, and 49,721 pounds by processing in Forest Service extractories), production of 106 million trees in Forest Service nurseries, and rehabilitation and development work at thirteen Forest Service nurseries to expand production and provide for more efficient operation. Application of special cutting methods on areas where there was a crop of tree seed and where site and weather conditions were favorable resulted in 128,133 acres of natural regeneration.

In addition to work done with appropriated funds and APW funds, 112,374 acres of land cut over by sale of National Forest timber were reforested with funds collected under authority of the Knutson-Vandenberg Act.

Progress continued on development and expansion of seed production areas and seed orchards necessary to produce tree seed that is of better genetic quality and more resistant to diseases than that available from natural stands.

In summary, the total area reforested in fiscal year 1964 was 348,698 acres, of which 220,565 acres were artificial reforestation, and 128,133 acres were natural regeneration accomplished by prescribed cutting practices.

An estimated 151,000 acres will be reforested by planting and seeding in fiscal year 1965.

Timber Stand Improvement. 479,829 acres of young growth were treated by various cultural methods to increase growth and improve quality; 154,061 acres were done with regular appropriated funds and 31,159 acres with APW funds. The work consisted principally of thinning and release. The same kinds of work were done on 294,609 acres with funds collected under authority of the Knutson-Vandenberg Act. Work with these funds is in stands of reproduction and young growth on areas cut over by sale of National Forest timber. (See Figure B-1.)

An estimated 245,000 acres will be treated in fiscal year 1965.

TIMBER STAND IMPROVEMENT (Thinning)



Thinning a crowded stand of pine (40 years old) with a motor-driven circular saw.



Thinned stand – trees are now free to grow. (See figure B-2)

Figure B-1

TIMBER STAND IMPROVEMENT (Release and Thinning)



Suppressed or crowded trees increase growth after release of thinning.

This 78 year old tree was 55 years old when it was released. Without release, it would have been little larger at age 78 than it was at age 55. It could have grown to its present size in 25 years instead of 78 years if it had not been suppressed or if it had been released shortly after it was established.

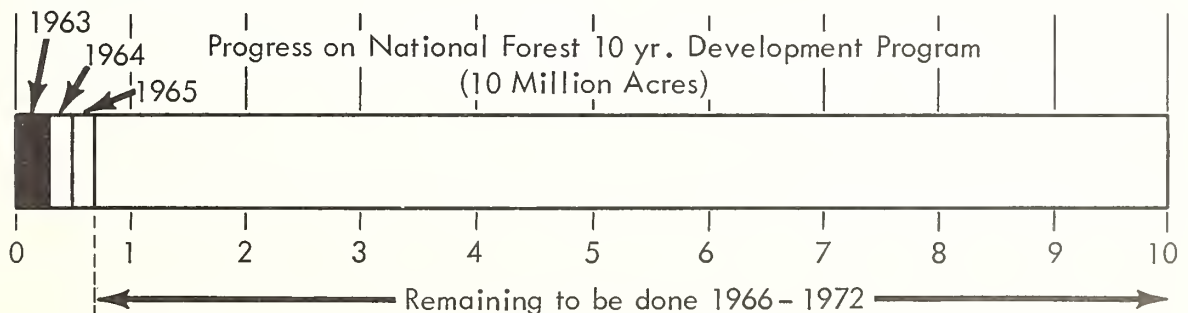


Figure B-2

REFORESTATION



Part of the 3.8 million acres of National Forest land needing reforestation-- This land has been idle for more than 50 years.



Clearing land of brush prior to planting trees. This type of complete clearing is necessary where the land is occupied by dense stands of brush.



A new forest established on cleared land previously covered with brush.

Reforestation
Progress on National Forest 10 Yr.
Development Program (3.8 Million Ac.)

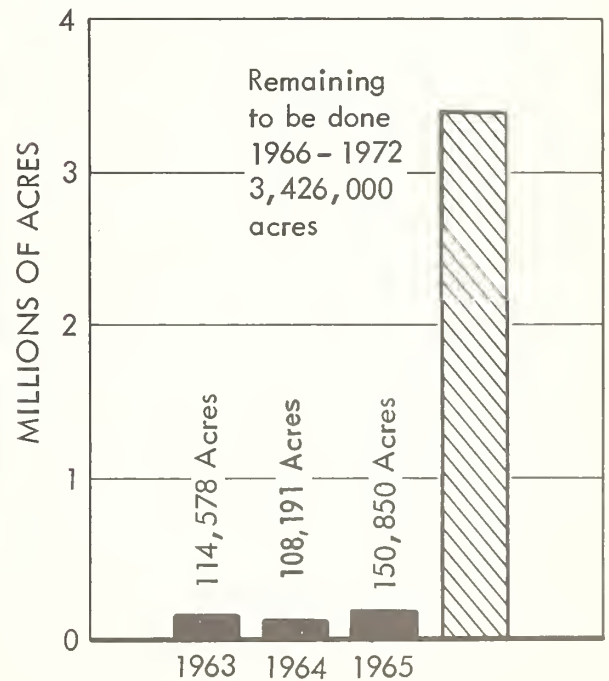


Figure B-3

(2) Recreation-Public Use \$27,510,000

An increase of \$2,100,000 for recreation-public use would be used to provide improved operation, sanitation, cleanup, and maintenance of recreation facilities; to develop new sites to alleviate some of the overcrowding; to provide necessary visitor information services; and to install a system of user charges as required by the Land and Water Conservation Fund Act.

The National Forests provide ever-increasing opportunities for outdoor recreation. Their use for this purpose has increased from 35 million in 1953, to 122.5 million in 1963 (over 300%), to 135 million visits in calendar year 1964 and to nearly 200 million visits by 1972.

As of June 30, 1962, overuse of developed National Forest campground and picnic facilities amounted to 70% beyond their capacity (Figure C-4). With several thousand new family units constructed during fiscal year 1963 and 1964, a total of 75,400 family camp and picnic units having a safe capacity of 31 million visitor-days camp and picnic use were in place in the National Forests as of June 30, 1964. However, use is also going up so that with an expected 47.5 million camp and picnic days of use in 1964 the overuse will be 53%. Even with the development of 4,820 family units in fiscal year 1965 the overuse will amount to 60% because of an expected 53.0 million camp and picnic visitor-days use in 1965. This overuse accelerates deterioration of facilities, degradation of the site, and reduces the comfort and enjoyment of the public. Strangely, as experience demonstrates, it also leads to vandalism.

To meet this quantity of use 283,000 family camp and picnic units - and 4,000 other types of recreation facilities must be available by 1972. At the 1965 appropriation level it would take over 30 years to provide these needed facilities. Failure to build to this level on timely basis will result in critical overuse, disproportionately increased costs for operation and maintenance, creation of major sanitation, stream pollution and user-safety problems, and will jeopardize other forest resources by forcing people into inappropriate locations where they create a fire threat and additional problems.

The importance of providing all National Forests with visitor services is reemphasized each year by the increasing use of the forests for recreation by the people of the United States. Visitor Information Services, by providing information, education, and interpretation to the forest visitor, makes him aware of the many benefits of forest lands and appreciative of the need to protect and use these lands wisely. The expanding population continues to make greater demands on the vital timber, range, wildlife, water, and recreation resources of our public lands. Through the Visitor Information Services program, visitor services ranging from simple nature trails to Visitor Centers housing exhibits and other interpretive facilities must be expanded to serve this increasing visitor use.

Project (2)

The proposed 1966 recreation budget would provide for the following:

Operation and maintenance. Adequate sanitation, cleanup and maintenance would be provided at the estimated 8,400 assorted recreation sites that will have been developed as of June 30, 1965. These tasks are of first priority in recreation administration and must be done daily on many sites. The problems of sanitation and care resulting from an estimated 145 million visits of all kinds in calendar year 1965 cannot be delayed or postponed.

A system of charging users at National Forest camp and picnic grounds and associated recreation facilities would be installed. This system would require purchasing and erecting equipment to collect the fees, relocating traffic patterns, providing necessary control to assure payment of required fees, and other wise implementing the charge requirement of the Land and Water Conservation Fund Act.

Betterment and rehabilitation of old facilities. By July 1, 1965, most of the rehabilitation of CCC-built facilities will have been accomplished, but the need for betterment work continues. For example, gravity or pumped water systems, and flush toilets are essential to meet modern user loads in many campgrounds and picnic sites. Public health and anti-pollution measures require improved sanitation and other facilities in organization, winter sports, swimming, and boating sites, and recreation reservoir areas.

Construction of new recreation facilities. The development of additional facilities is needed to accommodate at least some of the rapidly increasing public recreation demands. The proposed financing would provide for the construction of 5,370 family camp and picnic units, which will accommodate nearly 27,500 persons at one time, and one new recreation site at a cavern. (See Figures C-1 and C-2.)

Recreation management plans. Recreation management plans completed for each National Forest by or before the end of fiscal year 1965 are the basis for recreation area plans which allocate suitable lands to various types of recreation and prescribe specific types of development or classification. More than half of the needed plans should be completed by the end of fiscal year 1965. Through proposed 1966 financing approximately 500 additional plans will be completed by the end of fiscal year 1966 to cover the recreation areas and site complexes needed to satisfy public demands by the year 1972.

Visitor information services. Development is planned as follows, in addition to operation and maintenance of present facilities:

a. Visitor centers at:

1. Cape Perpetua Visitor Center - Siuslaw National Forest, Oregon (\$136,000)
2. Blanchard Springs Cave Visitor Center - Ozark National Forest, Arkansas, Main Section (\$50,000)

b. Guided and self-guided facilities. Trails, auto tours, and boat tours in and near recreation complexes. A total of 45 units of these types is planned. (Examples are: Tenderfoot Trail, Chugach National Forest, Alaska; Buckeye Trail, Wayne National Forest, Ohio; Nelder Grove Trail, Sierra National Forest, California; and Cherry Run area, Allegheny National Forest, Pennsylvania.)

c. Other facilities and services. A total of 29 units of additional vistas, overlooks, wayside exhibits, campfire circles, and interpretive signing are planned for fiscal year 1966. (Examples are: Campfire circle, Sinclair Lake, Oconee National Forest, Georgia; and Overlook, Pawnee National Grassland Unit, Roosevelt National Forest, Colorado.)

Examples of Recent Accomplishments

In calendar year 1963, 21.6 million visits were made for picnicking, 18.1 million for fishing, 9.9 million for hunting, 9.0 million for camping, 5.5 million for skiing and other winter sports. An additional 58.4 million visits were made to swim, hike, ride, and to enjoy the forest environment. In all there were 122.5 million visits, not counting those who simply drove through and enjoyed the forest scenery. This past winter season saw nearly 7.5 million visits to winter sports areas and the 1964 summer season has experienced more than the forecast use for camping, picnicking and similar seasonal activities. The record indicates that the strong growth trend in this important National Forest activity will continue.

<u>Calendar Year</u>	<u>Recreation Visits to the National Forests</u>	<u>Percentage Increase over 1953</u>
1953	35,403,000	--
1956	52,556,000	48
1959	81,520,000	130
1962	112,762,000	218
1963	122,582,000	246
1964 (Est.)	135,000,000	280

Recreation facilities in several Montana National Forests were severely damaged in the 1964 spring flood and \$350,000 of fiscal year 1965 funds are being used to repair the damage and restore the facilities.

Approximately 23,000 recreation special use permits are now in effect on the lands administered by the Forest Service. These include uses such as resorts, ski lifts, organization sites, and recreation residences. Fiscal year 1964 receipts from recreation use permits amounted to \$1,779,436.

Project (2)

Visitor Information Service facilities have been extended to more areas to provide visitors to the National Forests with information about recreational opportunities; forest land management; history and natural history of the forests; and the work of the Forest Service. Five major visitor centers are now in operation, two in construction stage, and one visitor center developed by APW funds. Over 200 vistas, nature trails, overlooks, and demonstration areas are in use as self-guiding facilities. During fiscal year 1965 program planning and development of services and facilities are directed to heavy use areas to meet the increasing information and interpretive needs of the National Forest visitors. (See Figure C-3.)



This recently completed recreation area on the George Washington National Forest will help provide for the continually increasing public recreation impacts.

Figure C-1



Intricate road systems and carefully planned recreation facilities are required on many recreation sites.

Figure C-2

VISITOR INFORMATION SERVICE

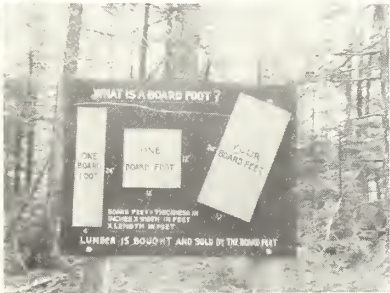
..... strives to meet the needs of all National Forest visitors

TO DO THE JOB WE USE :



INDOOR

EXHIBITS



OUTDOOR



VISITOR CENTER



INTERPRETIVE SIGNS



PERSONAL CONTACT

INDOOR



ON SITE



LEAFLETS, BROCHURES

Figure C-3

Relationship of Safe Capacity of Family Units at Camp and Picnic Sites to Actual and Projected Use

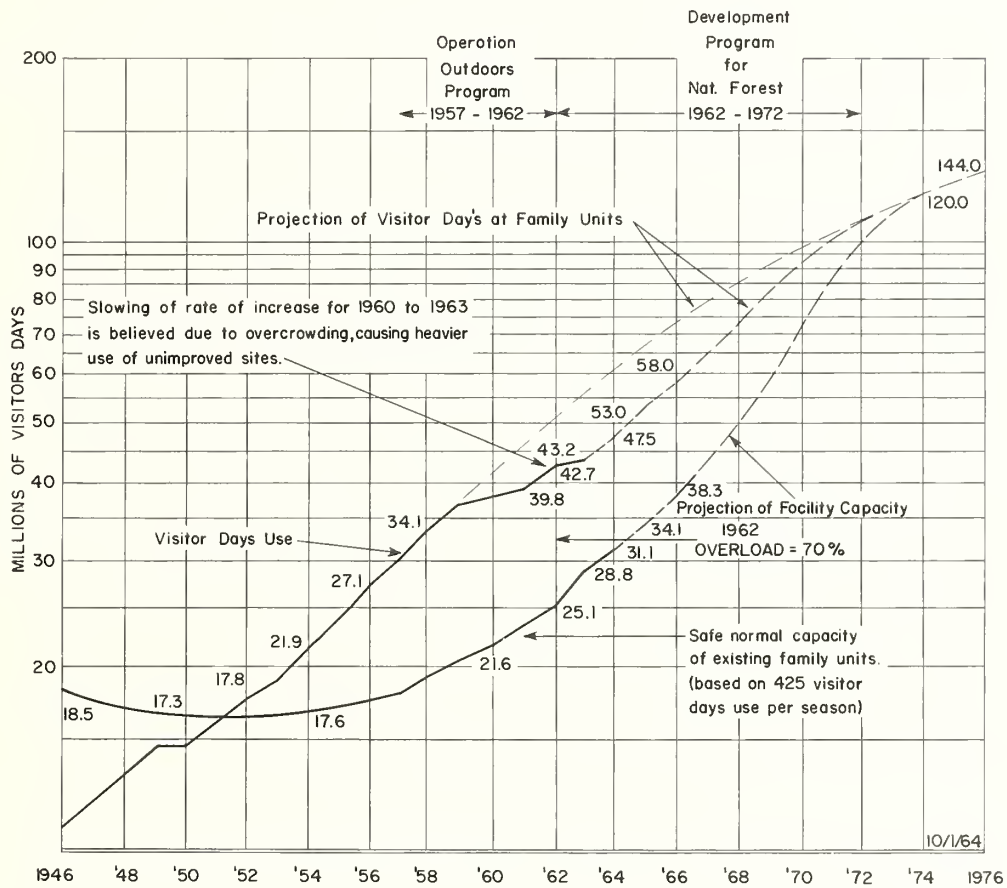


Figure C-4

(3) Wildlife Habitat Management \$3,808,000

No program increase is proposed for fiscal year 1966.

The more than 186 million acres of National Forests and National Grasslands produce one-third of the Nation's crop of big game animals and a substantial portion of small game and other forms of wildlife. These forests give rise to more than 80,000 miles of fishing streams, comprising a major part of the cold-water streams of the country. Hunting and fishing on these lands increased by more than 2 million visits in 1963, and the same upward trend is expected to continue.

Productive habitat is the key to wildlife production. Wildlife habitat can be improved by planned coordination with other resources and activities, by direct cultural practices, and through physical improvements. Under the proposed 1966 budget it is estimated that the following wildlife work will be accomplished:

Improving wildlife food and cover	63,000 acres
Providing new water facilities	1,000 units
Installing fish stream improvements	370 miles
Constructing lake improvements	1,500 acres

Examples of Recent Accomplishments

Wildlife habitat improvements are constructed and maintained (a) through cooperative agreements with State fish and game departments whereby both agencies share in the total costs; (b) through preplanned coordination whereby wildlife values are enhanced under other resource activities; and (c) under regular Forest Service improvement programs. Approximately \$130,000 of special State stamp funds are made available to the Forest Service along with other limited State funds deposited for use of the Forest Service on specific projects. (See Figure D-1.)

Major improvement accomplishments in fiscal years 1964 and 1965 are estimated as follows:

Project (3)

1964 (Actual)

	<u>Program</u>	<u>APW</u>	<u>1965</u>
Improvement of wildlife range	59,624 acres	7,740 acres	60,000 acres
Small water developments	999 units	552 units	900 units
Fish stream improvements	348 miles	46 miles	350 miles
Lake improvements	1,294 acres	291 acres	1,500 acres

Current emphasis is given to the assignment of wildlife specialists in strategic positions in the Forest Service organization to provide the needed skills for wildlife surveys, plans and technical phases of coordination.



Effective wildlife management on National Forests requires cooperative effort with State Fish and Game Department.

A newly-constructed National Forest fishing lake awaits filling with water and stocking with fish. It will then provide fishing for the increasing numbers of recreational visitors.



Management of big game range involves periodic measurement of forage production, degree of utilization, and vegetative change.

Figure D - 1

(4) Range Resource Management(a) Management \$5,254,000No program increase is proposed for fiscal year 1966.

Approximately two-thirds of the 186 million acres of Federal land administered as National Forests and National Grasslands is contained within 11,500 grazing allotments. An increase to 11,600 is expected by the end of fiscal year 1966. Upon these lands graze a total of about 6 million head of sheep and cattle owned by more than 19,000 ranchers and farmers. Paid permits are issued for 1.3 million cattle and 2.3 million sheep; the remainder of the 6 million livestock is predominantly offspring of the mature animals for which a fee is charged.

Because the National Forests and National Grasslands provide important supplies of seasonal forage, ranch operations and the economy of local communities have been built around the use of these lands. Grazing on the Federal lands enables Forest Service grazing permittees to make optimum use of an estimated 88 million acres of associated private lands for sustained livestock production. This combined use of public and dependent private lands makes an important contribution to the income and tax base of many local communities. It is estimated that holders of Forest Service paid grazing permits own land, livestock and buildings valued at \$2.1 billion. In 1962, the use of Forest Service lands contributed an estimated \$80 million to the gross value of livestock production for these grazing permittees.

Sustained progress is now being made toward full and proper use of the National Forests and National Grasslands for livestock grazing. Systems of management are being installed using facts obtained from range allotment analysis. The need continues high for assembling up-to-date basic facts about all grazing allotments through range analysis.

The 1966 budget request provides for completion of 688 units of range allotment analysis work. This accomplishment would bring the current analysis task to about 72% of completion. Periodic re-evaluation of range condition and its trend and other analysis determinations needed as an integral part of multiple use management would be a part of the 1966 work on a portion of the 11,600 grazing allotments.

Examples of Recent Accomplishments

With the accumulation of knowledge about range condition, its trend, and other management information through range allotment, analysis,

Project (4a)

FS personnel have the basis to do a better job of administering livestock grazing on the National Forests and the National Grasslands. Evidence of the use of this information is shown in many ways, including the establishment of intensive management systems. Analysis also has shown some allotments to be too large for proper use and they have been divided. Other analysis work has shown the feasibility of establishing grazing allotments in the South where none existed before. The consequence of these actions has been a steady increase in numbers of grazing allotments. From a total of 11,292 in 1960, number of allotments has risen to 11,500 in 1964. This increase of 208 allotments has resulted in a better job of resource management through greater opportunity for checks on forage utilization and other resource use control. In fiscal year 1964, 720 units of range allotment analysis work were accomplished. An estimated 688 units will be accomplished during fiscal year 1965. Re-evaluations of trend in range condition were made on schedule. Some of the kinds of work done in range analysis are shown in Figure E-1.

RANGE ALLOTMENT ANALYSIS PROVIDES BASIS FOR GOOD RANGE MANAGEMENT



Different kinds of range are studied. Information on kind and amount of vegetation and where suitable range areas are located is put on aerial photographs in the field. Maps are made from this information.

Photographs periodically taken at fixed points aid in determining trend in range conditions.



The rancher who grazes livestock on the National Forest or National Grassland provides valuable information needed in range allotment analysis.

The District Ranger and his Assistant discuss results of the analysis with the rancher who grazes livestock on the range.



Figure E-1

(b) Range Revegetation \$2,780,000

No program increase is proposed for fiscal year 1966.

Revegetating and controlling noxious and poisonous plants is needed on 4.0 million acres of rangeland during fiscal years 1963-1972 for substantial progress toward the long-range objective to achieve intensive management on all range allotments. An estimated 782 thousand acres will be rehabilitated by fiscal year 1965. Funding at the 1965 level through the remainder of the 10-year period would result in revegetation of approximately 1.7 million additional acres, or a total of 2.5 million acres for the 10-year period.

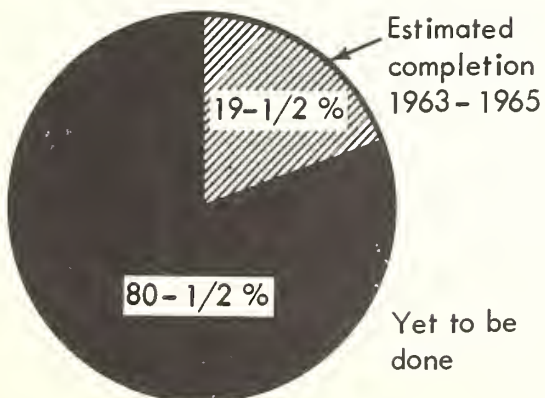
Administering the forest rangelands so as to best coordinate grazing use with the increased demand for livestock purposes and other uses is calling for continually improving the range resource and the level of management. The lands must be managed to realize their full potential. This requires, among other things, high forage production. Overstocking and other mistakes in management, some of which occurred prior to the establishment of the National Forests, resulted in changes in kinds and amounts of plant cover. Overly-dense brush stands, invasions of poor forage plants and bare areas have occurred. These lands are being restored to good forage production and watershed condition by proper rehabilitation treatment. Methods used to rehabilitate rangeland include plant control through application of herbicides or mechanical means, ground preparation and seeding, controlled burning, water spreading, and controlling rodents and noxious farm weeds. (See Figure F-1.)

Examples of Recent Accomplishments

During fiscal year 1964, the following range revegetation and plant and rodent control accomplishments were achieved by use of regular appropriations, Accelerated Public Works funds, and contributions by range users of the National Forests and National Grasslands.

	<u>Total Accomplishment</u> (Acres)
Revegetation seeding	73,378
Plant control (seeded)	33,988
Plant control (not seeded)	128,995
Poison plant control	1,038
Noxious farm weed control	5,528
Rodent control	24,287
Water spreading	6,588
Pitting, fertilizing & other	5,965

It is anticipated that 1965 accomplishments will be about the same.



Controlling brush and preparing land for reseeding is part of the program to rehabilitate by 1972 4.0 million acres of depleted rangeland. Equipment has been developed that is structurally suited to adverse conditions normally associated with wildland range rehabilitation operation.

10 Year Range Revegetation
Needs 4.0 million acres

Figure F-1

(c) Range Improvements \$3,339,000

No program increase is proposed for fiscal year 1966.

Range improvement programs are being put into effect after careful study of each forest range. Range allotment analysis currently being made includes information on the location of fences and water developments that are necessary to achieve intensive management on all range allotments. In addition, the existing 50,000 miles of fence and 28,200 water developments must be brought into serviceable condition and properly maintained. These necessary facilities cannot be adequately maintained each year, even with present \$1 million annual contributions from range users.

Range improvements are necessary to get the kind of range use that is needed and is compatible with other resources and uses. For example, livestock normally prefer certain portions of the range and will often overgraze these areas unless something is done to distribute the animals more evenly. Properly located fences and watering places are primary means of controlling livestock so that damage does not occur to the soil and vegetation, and thus depreciate watershed, wildlife, and other values. (See Figure G-1.)

Examples of Recent Accomplishments

During fiscal year 1964, the following range improvements were constructed by use of regular appropriations, Accelerated Public Works funds, and contributions by forest range users:

	<u>Total Accomplishment</u>
Fences (miles)	2060
Cattleguards (each)	382
Stock driveways (miles)	85
Corrals (each)	81
Water developments (each)	1879

Approximately 20% of the funds allocated were expended for maintenance of existing range improvements.

It is estimated that 1965 accomplishments will be approximately the same.

IMPROVEMENTS RESULT IN BETTER RANGE USE



An important part of the range improvement program is properly located watering places and fences which provide opportunities for better management through use of deferred-rotation and other grazing systems.



These cattle are grazing near newly developed water on an area which has been converted from chamise brush (background) to grass.

Figure G-1

(5) Soil and Water Management \$6,146,000

An increase of \$1,000,000 is needed for the program activities which aim: to improve the quality and timing of water yields from National Forest watersheds; to increase the usable quantity of water yield; to reduce flood threat; and to diminish damage to National Forest watersheds resulting from such surface-disturbing activities as: road construction, timber harvest, mining, and recreation development. The water yield from the National Forests and National Grasslands is a basic requirement of a sustained or improved economy, particularly in the rural areas of the Nation. In the eleven Western States these watersheds yield about 53% of the total runoff. This water is a direct source of supply for more than 1,000 communities and for a major segment of the agricultural, recreational, and industrial water needs.

The increase would be used to conduct hydrologic surveys and prepare plans of management on 60 selected watersheds where available water supplies are fully utilized and further economic growth of the locality is dependent upon increased water supplies which can be made available by improved watershed management techniques. These surveys and plans will establish technical criteria and standards of soil management and watershed protection to be used as guides in carrying out the multiple use objectives for which the National Forests and National Grasslands are managed. On the basis of these plans the annual amount of usable water yield will be increased, with particular emphasis on low flow augmentation, and improved water quality. It is proposed to initiate treatment programs on 5 watersheds. Technical watershed protection specifications will be prepared for an estimated 800 surface-disturbing activities which could seriously disturb the soil mantle. This will prevent serious damage to the watershed and to the quality of the water yielded.

Examples of Recent Accomplishment

In response to the increasing demand to improve the water yields of National Forest lands which produce more than 50% of the water supply of the eleven Western States an operational program of scientific watershed management was started in fiscal year 1963. The program is based on many years of watershed research which has produced scientific principles and proven techniques of forest land management to increase the quantity of water yielded, to modify the timing of runoff or to improve the quality of water yields.

Watershed Analysis and Plans

It is necessary to assign watershed scientists to the individual National Forests to translate research findings to operational practices. This has been done on 40 National Forests. One of the principal jobs of these scientists is to make hydrologic analyses of individual watersheds and prepare prescriptions to meet specified water quantity, quality and timing objectives.

Project (5)

Analysis and treatment prescriptions have been completed or are underway in 40 important watersheds. These watersheds are typically 50-100,000 acres in size. Practices prescribed for various watersheds include such things as: snow fencing or cutting timber in patterns to increase the winter snowpack and resultant water yield and to delay the season of runoff (see Figure H-1); converting brush cover to grass for increased water yield and to improve other resource values; identifying sources of pollution and prescribing methods of abatement; and developing plans for rehabilitation of eroding and sediment producing areas. Some of the watersheds for which treatment prescriptions have been prepared are the LaGrande municipal watershed in Oregon, the East Sevier River in Utah which is an important source of irrigation water, Sanata Ynez in California, the primary source of domestic water for the Santa Barbara metropolitan area, Lake Creek in Colorado, an important tributary to the Fryingpan Arkansas reclamation project and in the Salt and Verde drainages in Arizona.

Soil Surveys

Standard soil surveys were completed on 1.6 million acres during fiscal year 1964. It is estimated that standard soil surveys will be completed on 1.6 million acres in fiscal year 1965. These standard soil surveys provide a foundation for management for all of the resources (see Figure H-2). From soil surveys the resource manager can determine in advance the problems which might be encountered in road construction. He can determine the type of trees or grass which is best suited to planting on a particular area. He can determine how hazardous it is to the watershed to log or graze it by methods customarily used. He can predict the difficulty of getting a new timber crop reestablished if an area is logged. Ultimately soil surveys are needed for most National Forest lands. A total of seven million acres has received soil surveys to date.

Reconnaissance surveys covered 2.4 million acres in fiscal year 1964. An estimated three million acres will be covered by reconnaissance surveys in fiscal year 1965.

Preventing Watershed Damage

The specialized skills of soil and watershed scientists were used to prepare technical watershed protection specifications for about 800 projects which could have caused serious watershed damage. Advice was furnished in the fields of road and highway construction, timber harvest, mining operations, dam construction and watershed restoration projects.

Water Yield Improvement

A modest program of hydrologic restoration which has been in progress for many years was continued with emphasis on selected watersheds to

reduce flood runoff and to retard erosion as means of improving water quality. Areas burned over in current year fires were promptly treated to prevent watershed deterioration. During the last full fiscal year sheet and gully erosion on 28,600 acres was controlled by contour trenching and other methods; 149 miles of stream channel were cleared to halt streambank erosion and permit passage of fish; 2,480 miles of abandoned, eroding roads were stabilized; 35,600 acres of burned-over area were treated to prevent site deterioration.

A new program of scientific watershed management to increase the quantity of water and to improve the timing of runoff has captured the interest of many people dependent upon water from the National Forests. In Arizona, a pilot project aimed at increasing water yield has been underway for a number of years. The results of this pilot project have been so promising that it is being extended to all National Forest lands in the Salt and Verde watershed. This is the principal source of water for the important residential and agricultural Salt River Valley in Arizona.

On the San Isabel Forest in Colorado a water yield improvement project was initiated on Lake Creek which serves as important source of irrigation and domestic water. Instrumentation of the watershed was completed in 1964. A watershed analysis of the drainage was made and a design for improvement of water quality, quantity and timing was completed.

During fiscal year 1965 a start was made in application of the watershed prescription. The initial treatment of the Santa Ynez watershed in California was also completed in fiscal year 1965 to increase the total water yielding capability of National Forest lands.

Preliminary estimates indicate that on appropriate sites additional water can be produced at costs varying from about \$2.00 to \$6.00 per acre-foot.

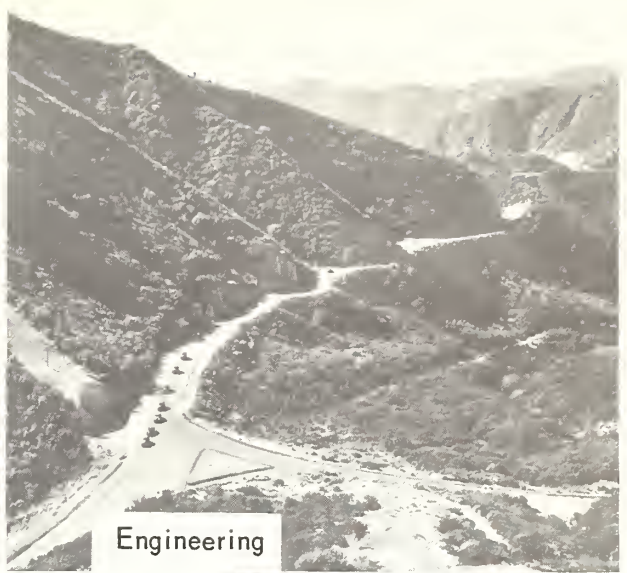


Most of the irrigation water in the semi-arid West comes from the high elevation and forested areas. Cutting timber in a prescribed pattern has increased the winter snow-pack and water yield on these watersheds in eastern Oregon. (Watershed scientists prescribe the cutting pattern in addition to providing watershed protection specifications for logging, road construction and other development and use.)

Figure H-1



Range



Engineering



Wildlife

SOIL SURVEYS PROVIDE A FOUNDATION FOR MANAGEMENT



Timber Management



Watershed Management



Recreation

Figure H-2

(6) Mineral claims, leases, and special uses \$3,904,000

No program increase is proposed for fiscal year 1966.

This program provides for supervision, administration, regulation and control of the special land uses and mineral disposal on National Forest lands.

The work involves mineral examination of mining claims included in patent applications and occupancy trespass action, determination of surface rights under P.L. 84-167, mineral leasing, mineral reservation and outstanding rights administration, and special uses (other than recreation). Occupancy and use of National Forest land for development and disposal of minerals is necessary and desirable as a part of sound multiple use management. However, strict and adequate control of occupancy and mineral operations is necessary to protect forest resources from damage and to assure the highest use of the land consistent with good management of all other resources.

Mineral examination of applications for patents for mining claims must be kept current. The detection and elimination of unauthorized use of mining claims which constitutes trespass and interferes with the orderly administration of the National Forests is an important activity and must be aggressively handled. Approximately 9,000 cases of occupancy occurring on mining claims should be reviewed within the next seven years to determine whether the use being made of the claim is authorized under the Mining Laws. These occupancies include all types of residential use (permanent, seasonal, and transient) where a cabin or similar structure exists on a mining claim. Failure to aggressively pursue such cases further complicates the problem, as it encourages disregard of the mining laws. The Church-Johnson Act (P. L. 87-851) for the relief of mining claimants has also increased the mineral examination and occupancy activity on mining claims.

There are close to 17,500 active mineral permits and leases in force, covering several million acres of land. Rentals and royalties are in excess of \$16 million per year. The work must be kept current to protect the public's interest. Between 7,000 and 7,300 mineral applications must be reviewed comprehensively and processed annually. The volume of mineral leases has steadily increased from 5,200 in 1951 to an estimated 17,500 in 1966. In addition, some 140 mineral reservations are being actively operated, covering 98,000 acres on which the owner retained the mineral rights when the land was purchased by the Government. The public values in the surface of the land must be fully protected.

Project (6)

Recently developed electric generating plants using coal along with new methods of mining have caused a big increase in coal mining operations. New methods of processing and upgrading of iron ore and taconite will make economic the removal of many low grade deposits. These factors have caused a stepup in leasing and in the mining of privately-owned minerals under lands acquired by the Forest Service. Much of this activity is in areas now experiencing economic depressions where underground coal and iron mining have steadily declined with a resulting decrease in employment. Development of the mineral resource is important in providing livelihood and bringing about an expanded economy in these areas.

Advanced technology and modernization of mining machinery now permits mineral exploration and development on many areas and for many deposits not formerly considered operable. An estimated 300,000 acres of National Forest and National Grassland in the Idaho-Utah-Wyoming area are underlain with phosphate. Geologic faulting makes surface mining the only practicable method to remove many of these deposits. An estimated 25 to 40 thousand acres may be involved.

Adequate control must be maintained over exploration and development under mineral lease and necessary guidance and assistance given operators under mineral reservations and outstanding rights to protect the other forest resources, such as water, recreation, and timber; to provide for their effective utilization; and to restore mined lands to productivity for surface management, resource development, and use.

Special use permits (other than recreation) for the use of National Forest lands have increased. There are approximately 37,100 permits and easements covering 4,700,000 acres of land and 56,000 miles of rights-of-way. These permits must be properly supervised and failure to administer them could result in serious damage to the National Forests and a direct monetary loss to the Government.

Competition for television, radio-electronic and similar uses for sites continues to increase. These uses require mountain peaks for advantageous coverage and many of these sites occur in the National Forests.

Examples of Recent Accomplishments

Mining Claims. The determination of surface rights of mining under the Act of July 23, 1955 (P. L. 84-167) continues to be a major activity. Following is a summary of progress to June 30, 1964:

	Number of Acres	Acres	Estimated Number of Mining Claims
Surface rights determination to be done (final estimate)	979	144,805,230	1,109,908
Field examination during 1963	33	3,989,607	3,486
Total field examinations completed	979	144,805,230	1,109,908
Determination job complete	720	104,836,127	797,396

As a result of determination of surface rights procedure, there are now 20,969 mining claims on which the claimants have asserted the validity of their surface rights. These claims are now being examined by the technical mineral examiners to determine their validity. 8,684 of these claims have been resolved in favor of the United States. That means that on 1945 million acres of National Forest lands which included an estimated 1.1 million claims, the United States now has the right to manage the surface on all but 12,285 claims. This figure will probably be further reduced as some of these claims may be resolved in favor of the United States.

Mineral Permits and Leases

The Secretary of Agriculture has the authority to dispose of common varieties of mineral materials on all lands under his jurisdiction. However, claims continue to be located under the mining laws and require contest action to determine the nature of the material and the related legal authority for its removal. (See Figure I-1.) Illegal occupancy and use frequently result in severe surface damage and abandonment of unsightly facilities as shown in Figures I-2 and I-3. Where use is properly controlled by permit, the damage during operation can be held to a minimum by careful supervision; restoration and rehabilitation of the area required after mining ceases; a fair price obtained by the Government for the material; and a contribution made to local and State economy. Mineral permits and leases are issued by the Bureau of Land Management, Department of Interior, with the advice or consent of the Forest Service. The Forest Service supervises the land management, protection, restoration, and rehabilitation provisions of all such leases and permits on National Forest land. Frequent field checks and supervision are needed to prevent and correct improper use. The volume of mineral leases on land reserved from the public domain is steadily increasing. In 1964, about 12,000,000 acres were under lease. The receipts from these leases are not credited

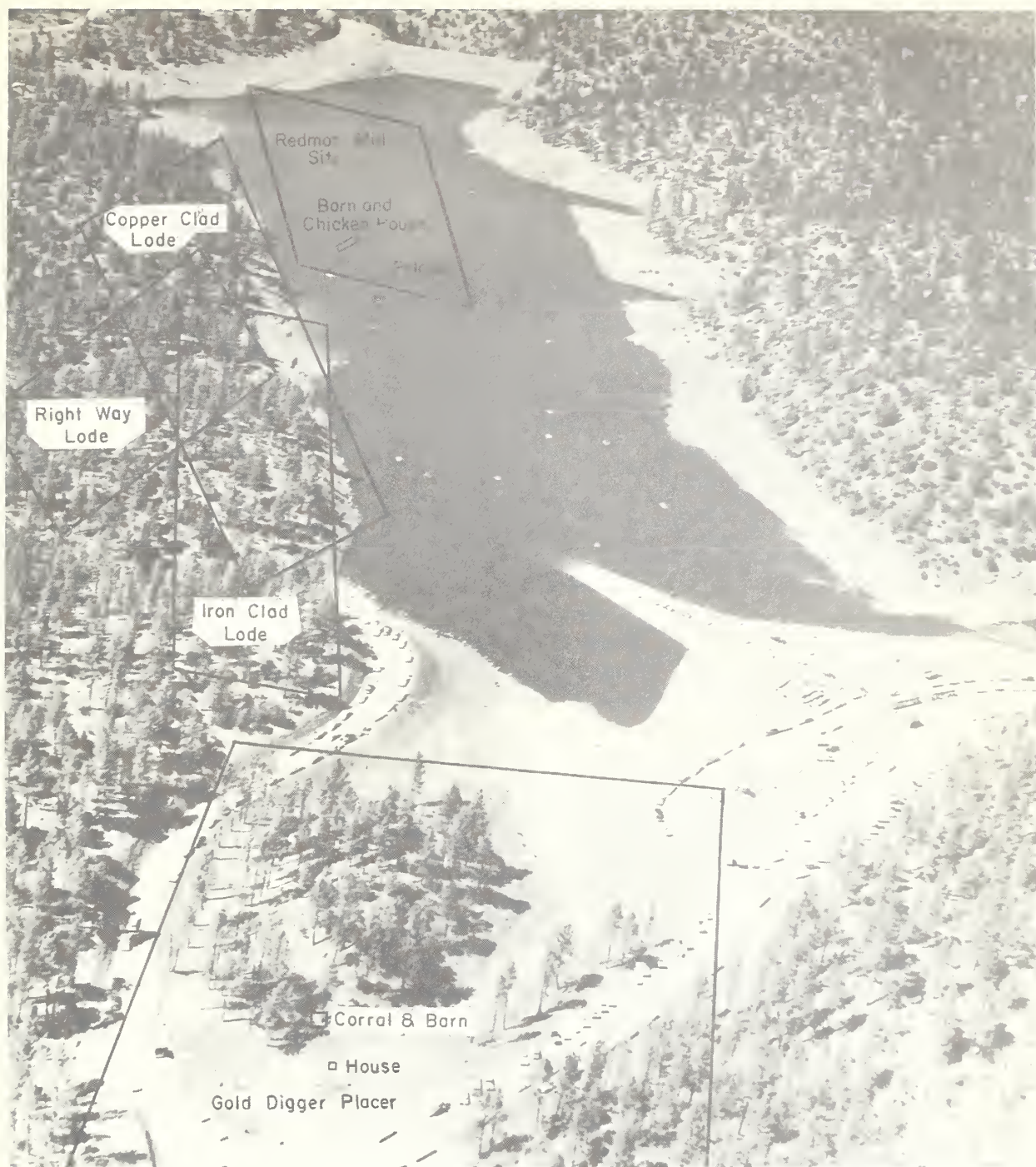
Project (6)

as National Forest receipts, but are collected by the Department of the Interior and distributed to the reclamation fund, to States in which the lands are located, and to the Treasury as prescribed in applicable legislation. They are estimated at between \$16 and \$17 million. Fiscal year 1964 mineral receipts were \$3.4 million for approximately 5,000,000 acres acquired lands under permit or lease. An underground gas storage project on lands under oil and gas lease in the Monongahela National Forest, West Virginia, has or will result in royalty and revenue payments of more than a million dollars with an annual anticipated payment of \$55,000. Some half million acres are under permit from the Forest Service for preliminary geophysical and geological prospecting and for common varieties. Over 80,000 acres are being actively operated under reserved right or mineral reservation. Industrial development and utilization of mineral resources are important to local economies. For example, investments in mines and mills in and adjacent to the Clark National Forest in Missouri, already built or contemplated, amount to more than \$70,000,000. Royalty receipts on lead production from Federal lands in this area are expected to approach \$300,000 annually within a few years. Strip mining creates difficult land use and protection problems. (See Figure I-4.) Road construction, location of improvements, construction of dams and reservoirs, protection of soil, water, and other surface resources, and fire protection require continued vigilance.

Special Uses

National Forest land and other land administered by the Forest Service may be used for special purposes when such uses are in the public interest. Now in effect are about 37,000 special use permits covering 51 different purposes, such as archaeological research, hay cutting, electronic installations, reservoirs, water supplies, and many other desirable uses. Fiscal year 1964 receipts for special land uses were:

Power	\$ 80,935.65
Other land uses	<u>468,908.61</u>
Total	\$549,844.26



The five mining claims superimposed on the above photograph were contested and resulted in their being declared null and void. This made it possible to develop the Lynx Lake Recreation Area on the Prescott National Forest. The lake, created through the cooperation of the State of Arizona, was partly filled at the time the photograph was taken. The area was opened to the public in the spring of 1964 and use has been high averaging about 2,300 visits on week-ends. The use of week-days is estimated to be about 75 visits.

Figure 1-1

RESULTS OF UNPROFITABLE MINING OPERATIONS



The rock business hit its peak in 1957. Housing was needed for the hundreds of rock doodlers. This old trolley was hauled in from Los Angeles for housing. The rock business has dropped back to almost nothing compared with 1957. The trolley has been empty for four years now.



This is a doodlers camp, built in 1957 for the many workers. Only one of the cabins has been occupied off and on for the past three years. The cabins are poorly built. Unoccupied and abandoned they will soon be a pile of trash like the middle cabin, which was blown down by the wind.

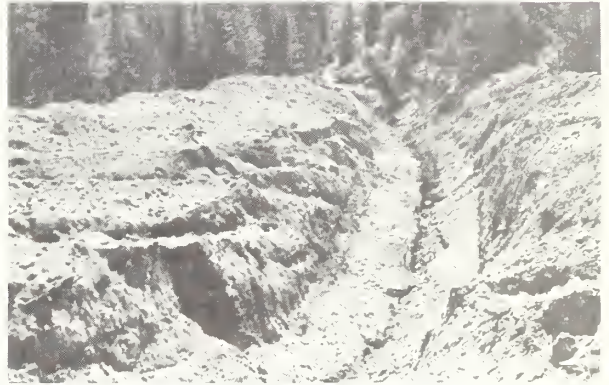
Figure 1-2

UNREGULATED USE CAN RESULT IN SERIOUS RESOURCE DAMAGE



This---

---Not This



Close supervision and control over use of National Forest lands to assume adequate protection and proper multiple use of other forest resources.

Figure 1-3

STRIP MINING



This land in the Clark National Forest was purchased by the United States subject to a 99-year mineral reservation. The operator has the right to mine and mill the barite ores found without having to restore the land to productivity.

Figure 1-4

(7) Land Classification, Adjustments and Surveys \$4,512,000

An increase of \$500,000 would be used to increase the verification, recovery, and monumentation of property corners through cadastral surveys by the Bureau of Land Management. This increase would be allocated to the Bureau of Land Management to carry out this work on problem areas related to the National Forests.

Other aspects of the program are concerned with the study and classification of lands as to their suitability for inclusion or exclusion from the National Forests, National Grasslands, and other land areas administered by the Forest Service; adjustments of land ownership in these areas through exchange, donation, purchase and transfer; establishment of property lines; maintenance of accurate ownership and status records for all lands administered by the Forest Service and the reproduction of essential administrative maps. These functions are basic to the Forest Service land management program. Ownership patterns are a first consideration in planning and installing improvements and land treatment measures and in carrying out protection work.

Land Line Location

This program was started in 1958 to locate and perpetuate the 1,132,353 property corners and 281,168 miles of property lines for lands administered by the Forest Service. The program was needed to prevent loss of corners costly to relocate by cadastral surveys, to provide accurate location of property lines in connection with the phenomenal increase in multiple uses, and to cooperate with adjoining owners in timely land line work of common benefit. (See Figure J-2.) Prior to this there was no provision for maintenance of corners and lines by the United States. The accumulated results of deterioration since the original monumentation become more pronounced with each passing year.

Since 1958 search has been made for 84,386 corners and 31,903 have been monumented or remonumented. Also, 5,294 miles of property line were marked to full standard and 20,072 miles to less than full standard. Each year since the program was started we are finding a lower percentage of corners with acceptable evidence of such corners. At current level of financing, it will take at least 40 years to complete this program.

During calendar year 1963 the following was accomplished:

Field search for property corners	20,918
Corners monumented with metal pipe and caps	9,912
Property lines marked and posted to standard	764 miles
Property lines marked and posted to partial standard	1,431 miles

It is estimated that during calendar year 1964 field search will be made for 21,000 corners and 10,000 corners will be monumented or remonumented.

Project (7)

It is estimated that 10,000 property corners are being lost annually due to the ravages of time and lack of maintenance. At current costs, it is estimated that cadastral surveys to relocate these corners would cost \$1,000 per corner; annual loss, \$10,000,000.

An increase of \$500,000 appropriation to the Bureau of Land Management to carry out its official duties in corner verification, recovery and monumentation will reduce this loss an estimated 30% or \$2,400,000.

There are other frustrating losses to the United States that will be heavily reduced by the \$500,000 increase.

These are occurring mainly in timber and occupancy trespass. They occur where the property lines were either never located, or are so obscure that work by BLM is required to prevent trespass and to establish an adequate basis for court action to recover damages and abate trespass. The Forest Service does not have a complete inventory of such trespasses which cannot be established before completion of the search for 554,000 property corners for which BLM has responsibility. Search by the Forest Service thus far indicates that significant timber trespass may have occurred in some locations. Collection from larger owners can be made if timber volumes can be established. However, current experience is that by the time BLM surveys are made, the cutting is so old that timber volumes and values cannot be established to the satisfaction of the court, or the trespasser is unknown or without assets. It is estimated that annual losses are from \$1,000,000 to \$5,000,000 - mainly in California, Oregon, Washington, Idaho and Montana. This loss can be reduced at least 50% by the proposed increase in appropriation. Frustrations in day-to-day administration of lands of the United States where their location is uncertain are very real, although hard to measure in dollars. The most efficient and timely development of resources cannot be planned. Confidence in public administrators is impaired. Adjoining owners question the neighborliness of the United States as a land-managing neighbor.

Work proposed for fiscal year 1966:

Field search for property corners	22,000
Corners monumented or remonumented	10,200*
Identify, survey, and post land lines (miles)	1,350
Maintain land lines (miles)	2,500

*8,500 of these corners are on land reserved from the Public Domain where it is the function and responsibility of the Bureau of Land Management to do the actual monumenting.

Land Exchange and Ownership Adjustments

There is a continuing need for the Forest Service to trade lands with private owners to consolidate the land it administers. Such trades, properly carried out, benefit both the Government and the private owner. They promote greater efficiency in National Forest administration. Land exchange proposals by private owners currently exceed the volume of such work that the Forest Service can handle.

The scattered pattern of National Forest ownership that exists in many areas is a major problem in multiple use resource management. Purchase of key intermingled private tracts facilitates management but the only practical means of obtaining better consolidation in many areas is by land exchange. The objective for the current 10-year period (1963-1972) is to exchange 1.5 million acres of National Forest lands for key private tracts which are better suited to National Forest purposes and contribute to ownership consolidation. This requires examination and appraisal of 350 to 400 thousand acres of land each year because this work must be done for lands both given and received in exchange.

Following is the work planned with the 1966 budget as proposed:

Examine lands for exchange	250,000 acres
(130,000 acres offered; 120,000 acres selected)	
Complete land exchange appraisals	150,000 acres
(85,000 acres offered; 65,000 acres selected)	

Efforts to increase the land exchange program accomplishments are beginning to show significant results. A total of 124 cases were approved in fiscal year 1964, an increase of 49% over fiscal year 1963. In these exchanges the United States will grant 124,800 acres of land and timber valued at \$12,757,394, and will receive 120,108 acres of land and timber valued at \$13,905,556. The approved exchanges include a number of complex transactions often involving values in excess of a million dollars and requiring high technical competence in the appraisal job.

The maps shown on Figure J-1 show the ownership pattern "before" and "after" one major land exchange approved in fiscal year 1964. An exchange of this magnitude obviously will have major impact on resource management and regional economy. In this particular case, the United States receives 27,780 acres in return for 22,160 acres having substantially equal value. The checkerboard ownership pattern depicted in the "before" map poses nearly insurmountable resource-management problems. These problems are drastically reduced in the ownership consolidation brought about by exchange as shown by the "after" map (each square on the maps represents one square mile on the ground). Most exchanges are smaller in scale than this one, but just as important from a local standpoint.

Land Status Records

Unit managers on all the approximately 1100 field units of the Forest Service need currently accurate status records showing all ownerships (fee, reservations, outstanding rights, encumbrances, etc.) and use restrictions. Old status records are neither complete nor accurate. Good status records are required to administer the property ownerships of the United States in neighborly harmony with adjoining owners and to fully protect the interests of the United States.

Work on a revised system was started in 1962. All actions affecting ownership status will be ascertained. A central unit in each of the 10 Forest Service Regions will produce, keep current, and furnish the status records to all field units in the Region. About 10% of the revised system has been completed. At the present rate of progress it will require over 20 years to complete this job.

Some 17,000 townships (or equivalent area units) in the National Forest system are involved. Work thus far is revealing about two serious omissions or errors per township, and many lesser, but significant errors.

Land classification. A continuing analysis of the exterior boundaries and interior land ownership patterns of the National Forest System is conducted to promote effective national land conservation and development programs. Studies are conducted to determine and recommend changes in land ownership or jurisdiction that would enhance opportunities for public programs to provide outdoor recreation, wildlife habitat, timber products, livestock forage, and protection of water resources. Analyses include consideration of potential purchase areas, land transfers (legislative and administrative) or exchanges. Careful consideration is given to changing patterns in land use, especially on private lands, public need for the resources and uses National Forests offer, opportunities for improving the efficiency of public land administration, and the probable effects on local economies.

Joint study with the National Park Service, Department of the Interior, is being made of the Sawtooth Mountain area in Idaho for purposes of recommending administration and management that will be in the best interests of the public. The study area approximates 570,000 acres and includes parts of three National Forests. (See Figure J-4.) Field analyses include the assembling of basic information to assist in ascertaining optimum use and development of the area, whether more restrictive dedications to recreational use are warranted, and the feasibilities, costs and economic impacts of a desirable management program under respective alternative agency jurisdictions of the land. The Bureau of Outdoor Recreation is cooperating in some aspects of the study.

Cooperative studies are continuing with the Bureau of Land Management, Department of the Interior, relative to opportunities for more efficient management of lands through specific transfers of jurisdiction in the western states, with special emphasis on enclaves of unreserved public domain inside National Forest boundaries.

Agreement on policies for administration of recreation and other resources at Department of the Army water resource projects affecting National Forests, and for related transfers of land jurisdiction, was signed by the Secretary of the Army and Secretary of Agriculture. This agreement will promote resolution of land and resource jurisdiction questions at over 20 existing or authorized water resource projects and numerous others being planned.

As a followup on recommendations of the Bureau of Outdoor Recreation, concurred in by the President's Recreation Advisory Council, arrangements for Forest Service administration of recreation resources at Allegheny Reservoir in Pennsylvania and subsequent transfer of lands were completed. It is proposed to extend the National Forest boundary to encompass all of the reservoir-related lands.

Analysis of the extent, urgency for acquiring, and relative availabilities of private lands located in classified Wilderness Areas was made in the interest of directing attention to the problem and pointing up acquisition programs. Similar planning for other implementation of the Land and Water Conservation Fund is in progress.

Joint studies are continuing relevant to establishment of National Recreation Areas which include National Forest lands in California, Utah, Virginia and West Virginia. These involve selection of jurisdictional boundaries, suitability of lands, and related programming for acquisition and development of lands having important recreational values.

Mapping

Adequate maps are essential for multiple use planning and for the special recordation of resource information. Accurate contour maps are of great value in planning transportation systems and planning timber sales. At present contour maps adequate for these uses are only available on 38% of the approximately 617,000 square miles in the National Forest system. (See Figure J-3.) It is necessary that the Forest Service maintain a mapping program to meet Forest Service priorities for use.

The funds requested for fiscal year 1966 would be used to procure mapping aerial photography, establish horizontal and vertical control, produce map manuscripts, and make field check of map manuscripts for an equivalent 3,800 square miles of contour maps; an equivalent 15,000 square miles of planimetric maps; and compile map manuscripts for photolithographic reproduction of 15 forest maps to a scale of $\frac{1}{2}$ " equals 1 mile.

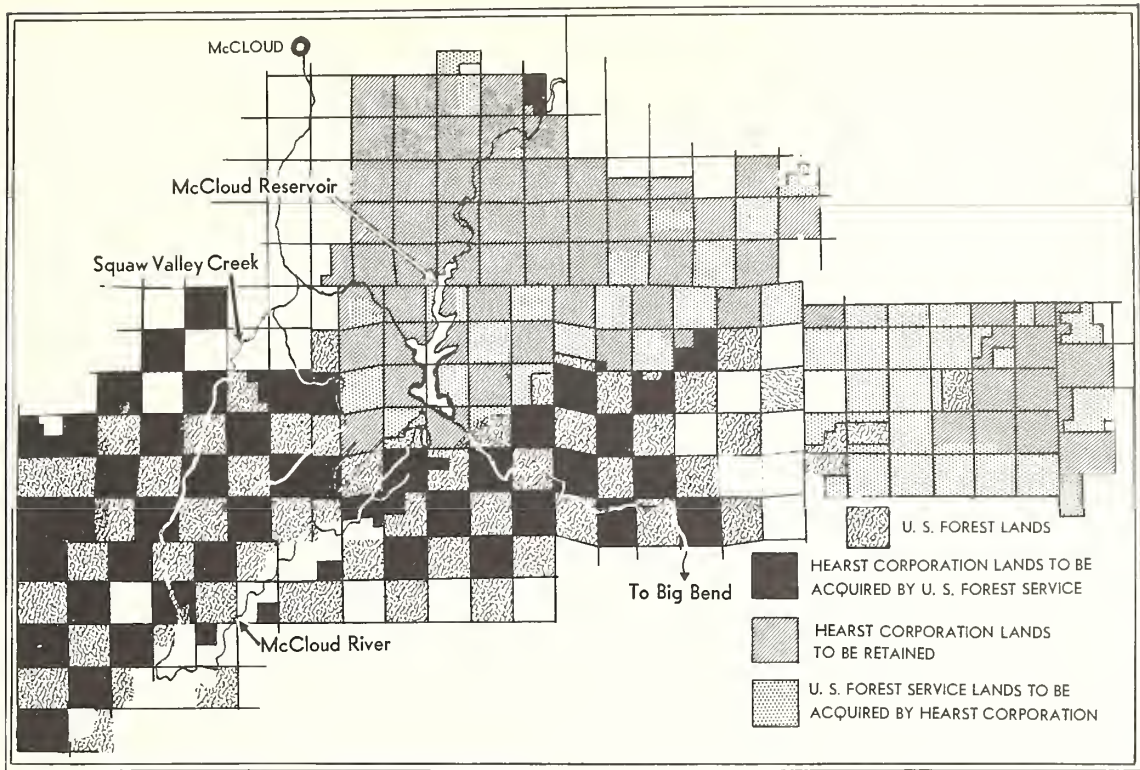
Project (7)

Fiscal year 1965 estimated accomplishments are:

1,946 square miles contour maps completed and an additional work equivalency of 1,900 square miles; 5,000 square miles planimetric mapping completed and more than half completed on an additional 10,000 acres; produce fifteen National Forest maps.

Reliable planimetric maps meeting the requirements for accelerated management activities are now available for about 52% of total requirements for administering the National Forests and Grasslands. Topographic maps are available for approximately 38% of the required coverage.

CONSOLIDATION OF OWNERSHIP THROUGH EXCHANGE BEFORE



AFTER

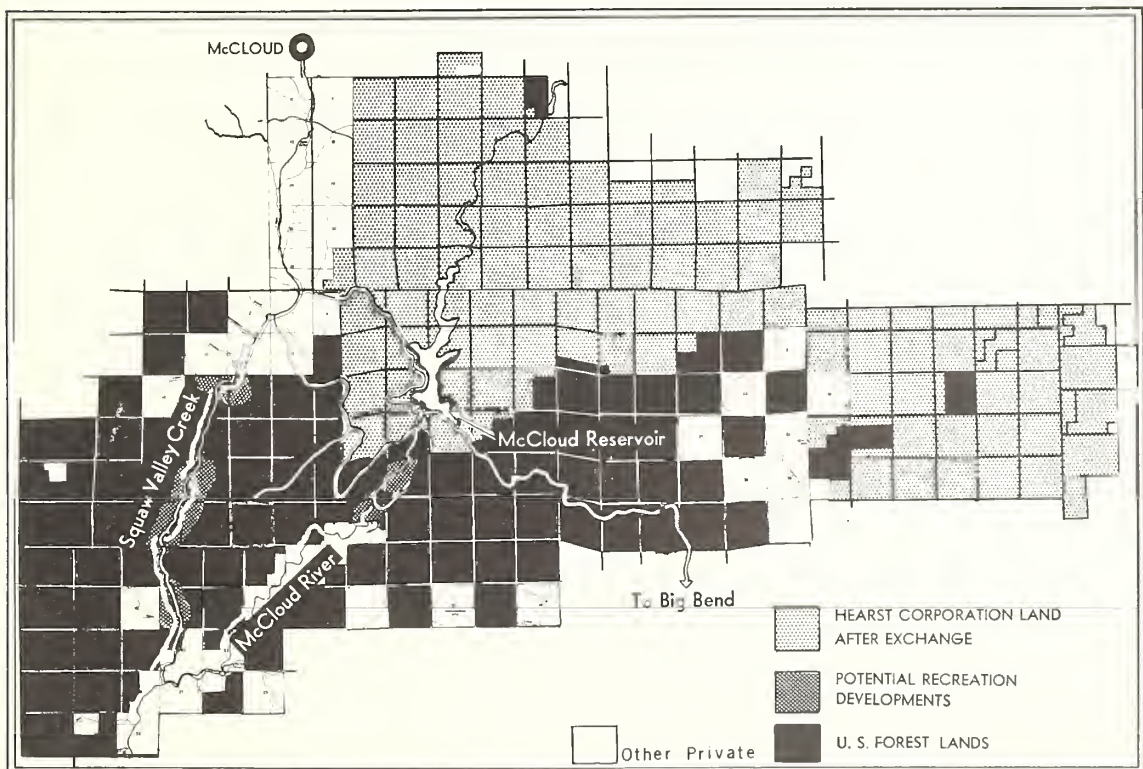


Figure J - 1

OCCUPANCY TRESPASS



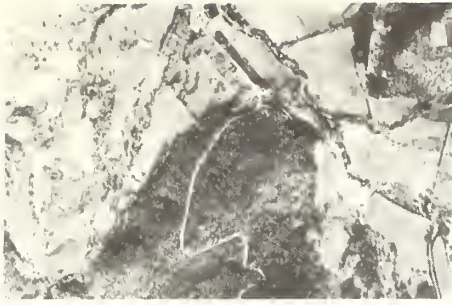
One summer home completed, foundation started for another; both partially on Government land. Trepass found through Land Line Location Program work. Note outhouse wholly on Government land.



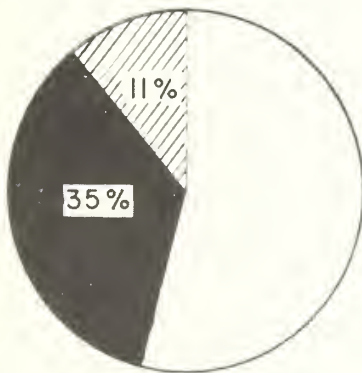
Another summer home on Government land. Property corner remonumented; marked and posted property lines.

Figure J - 2

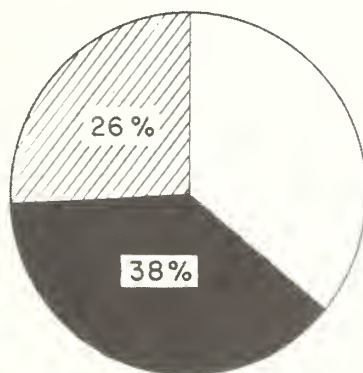
MAPPING



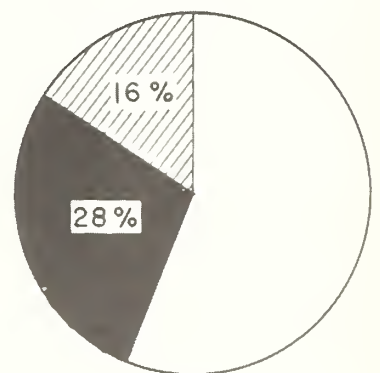
Aerial photographs, controlled by field surveys, are used in stereoscope plotting instruments to photogrammetrically produce a contour map manuscript. This manuscript is used in the preparation of the published contour map essential to resource management plans.



CONTOUR MAPPING
617,000 Sq. Mi.



PLANIMETRIC MAPPING
791,000 Sq. Mi.



**FORESTS & GRASSLAND
MAPS - 259**

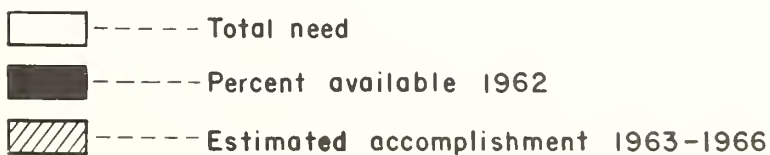
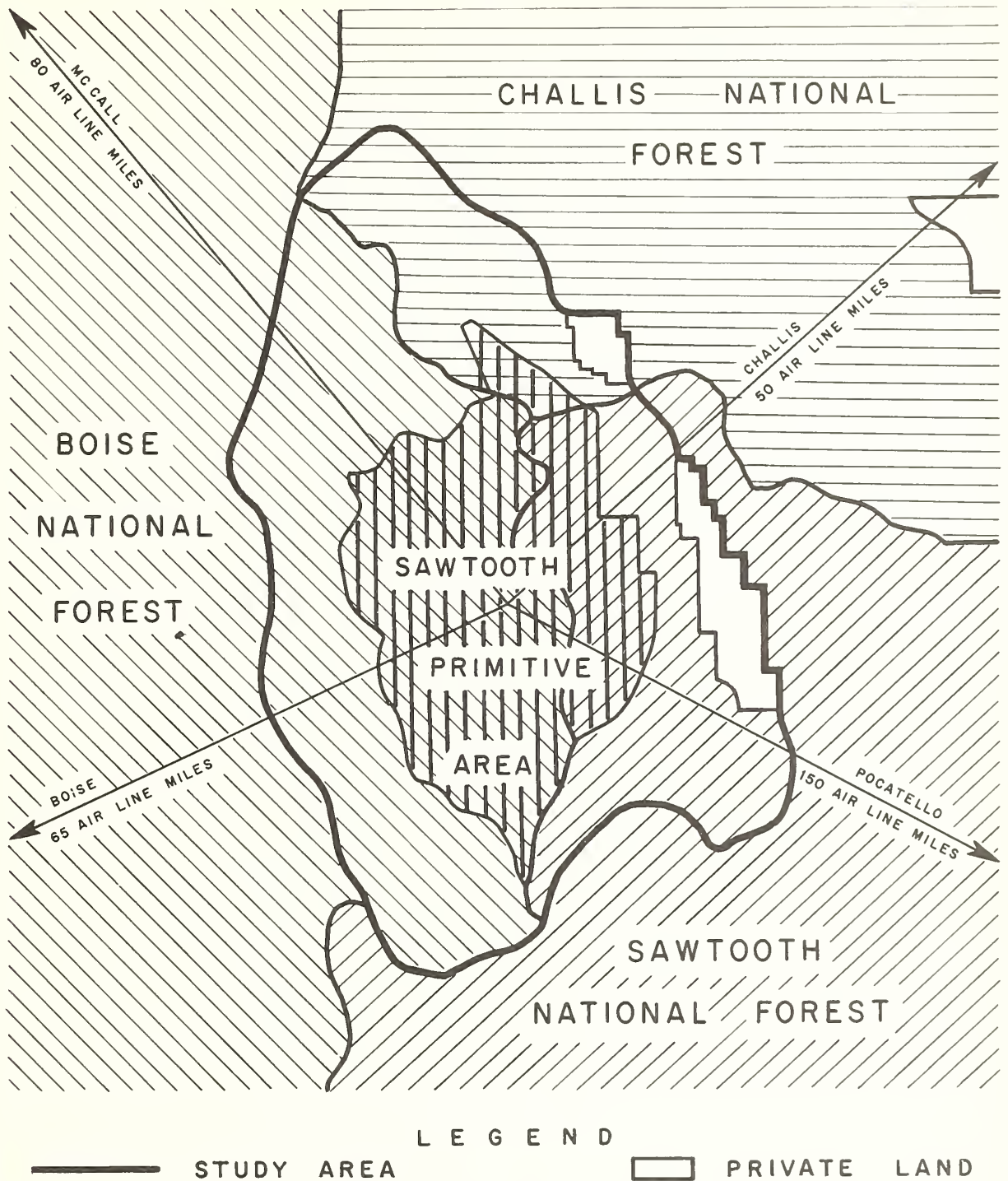


Figure J-3

SAWTOOTH STUDY AREA - IDAHO



The Sawtooth Mountain Area in Idaho is under a joint Forest Service - National Park Service study. It comprises 570,000 acres and contains parts of three National Forests, including a classified Primitive Area and private lands. Purpose of the study is to recommend administration and management that will be in the best interests of the public.

Figure J - 4

(.) Forest Fire Protection \$23,564,000

No program increase is proposed for fiscal year 1966.

Forest fires damage and destroy the resources of the National Forests as well as threaten the personal safety of firefighters and forest users. Resource losses have averaged more than \$22 million during the past five years in Forest Service protection areas. In these five years 67 firefighters have lost their lives fighting these same fires. In addition to the loss of resources and human life, firefighting costs have averaged more than \$27 million annually during the same period. Acceptable fire protection can be accomplished if fire hazards are removed, man-caused fires reduced, and fires that start are promptly detected and rapidly and aggressively attacked. The risk of man-caused fires grows each year as the use of the National Forests increases. Fire protection must be correspondingly strengthened to meet this impact.

For fires that do start, rapid and sufficient initial attack can control such fires with a minimum of cost and resource loss. The long-term objective is to hold fire losses below the level which will seriously interfere with the needed productivity and usefulness of the National Forests and Grasslands.

Fire control is a highly technical and scientific job. Continuing research and development provide numerous technical changes. These changes, together with improved direction and leadership, must be aggressively applied for successful fire control. Periodic reappraisal of the fire control program is a necessary and regular part of Forest Service management. This appraisal aims to study in depth the needs and application of fire control, using current data, research, new techniques and equipment. It evaluates present Nation-wide forest values and established performance requirements and standards commensurate with resource needs and management objectives. Such an appraisal is underway in all units.

Project (8)

The proposed 1966 budget would provide for the following estimated protection measures:

Fire Prevention	\$3,430,000
Fire Detection	3,260,000
Fire Attack Forces	13,340,000
Air Operations	2,130,000
Fuel Modification	500,000
Equipment Development	600,000
Studies, Surveys, Plans and Special Training	500,000
	<hr/>
	\$23,560,000

Examples of Recent Accomplishments

To meet increasing risks and the rise in number of man-caused fires from more forest users and other reasons, fire prevention was strengthened and emphasized in calendar year 1963. In critical man-caused fire areas, particularly those with incendiary problems, additional law enforcement-investigator specialists were assigned. A national training workshop was held for key prevention administrators and law enforcement personnel. During the past few months there has been a sharp increase in the number of law enforcement cases successfully settled or prosecuted. This program provides a continuing deterrent to violators, reduced man-caused fires, and returns to the Government some of the costs of suppression and losses of resources.

There is an increased use of better and more economical chemicals in air and ground tankers to retard fire spread. These chemicals work than double the effectiveness of water. (See Figure K-1.)

The fire hose thread standardization program is nearing completion. This will provide standard hose connections for the Forest Service with other agencies and fire organizations where exchange or cooperative pumping equipment is needed. Standardization of hose threads to the National standard fire hose thread throughout the country will be a major advantage for firefighters. It is important in planning Rural Fire Defense. It is a step forward in meeting nationwide fire protection responsibilities.

An extensive program is underway throughout the National Forests to determine the extent to which aircraft detection can replace the traditional fire lookout. The airplane is capable of doing a better detection job with fewer people at less cost. The program has excellent potential in reducing capital investment in lookout towers, operating costs, and resource losses. (See Figure K-2.) In many areas, the aerial detection program is coordinated with other Federal and State fire control organizations.

Project (8)

A programmed text designed to teach the fundamentals of fire behavior is being widely accepted and is accounting for an estimated savings of 19,000 man-hours per year in training time, as well as providing better training. (See Figure K-3.)

Equipment development and testing is going forward on about 25 projects to improve fire control efficiency. Testing and development show promise of illumination devices and techniques to enable the firefighter to perform more effectively and safely at night. Testing and evaluation are underway of night helicopter operations. Night navigational aids look promising to permit extra hours of service from helicopters.

A special fire coordination study is underway for the Office of Civil Defense and Office of the Secretary of the Army.

More nations are looking to the United States for information and assistance in fire control. Many foreign representatives are coming here for a first-hand look, and fire control specialists from this country have been sent to other nations to provide assistance during fire disaster periods.

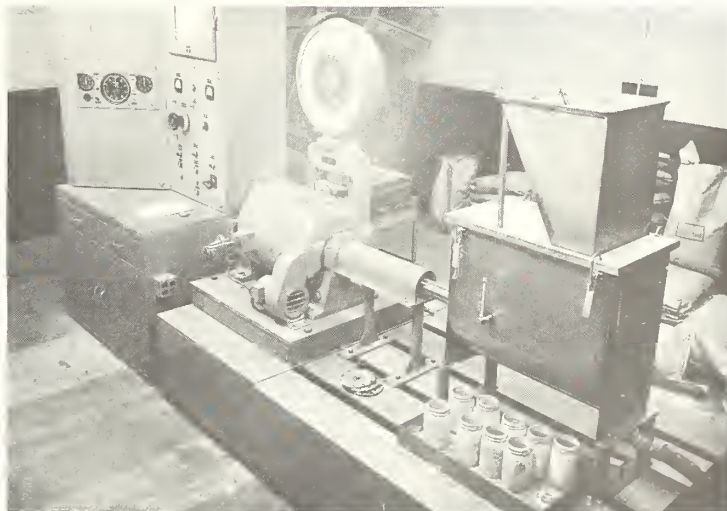
Additional centralization of fire control facilities was made at the Redmond Air Center in Redmond, Oregon, dedicated on August 29, 1964. This air center, with its crack firefighting crews, smokejumpers, air tankers, helicopters, and transport planes, will be the hub of air operations for the Forest Service in the Pacific Northwest Region.

Fuel type modification to reduce the risk of fire ignition and fire spread was accomplished on about 300 acres in fiscal year 1964. Estimated accomplishment for fiscal year 1965 is 1,000 acres.

PROGRESS IN DEVELOPING AND TESTING FIRE RETARDANTS



Engineers measure the corrosive effect of chemical retardants on metals used in fire control equipment. This engineer is checking the corrosion on stressed aluminum strips. Metal such as this would be found on air tankers.



This instrumented test stand is used to improve mixing practices and hardware. It measures power requirements for mixing various fire retardant chemicals and defines viscosity and cohesion characteristics.

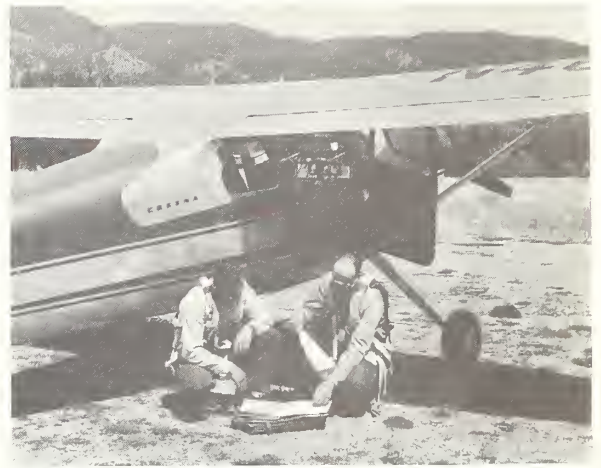
Figure K - 1

PROGRESS IN FIRE DETECTION



Light aircraft such as this are replacing many ground detection stations.

These men are planning a fire detection flight over one of the National Forests.



Elimination of lookout buildings such as this will reduce capital investment expenditures, cut operating costs, and provide more efficient fire detection service.

Figure K - 2

FIRE CONTROL TRAINING

INTRODUCTION TO THE FUNDAMENTALS OF FIRE BEHAVIOR

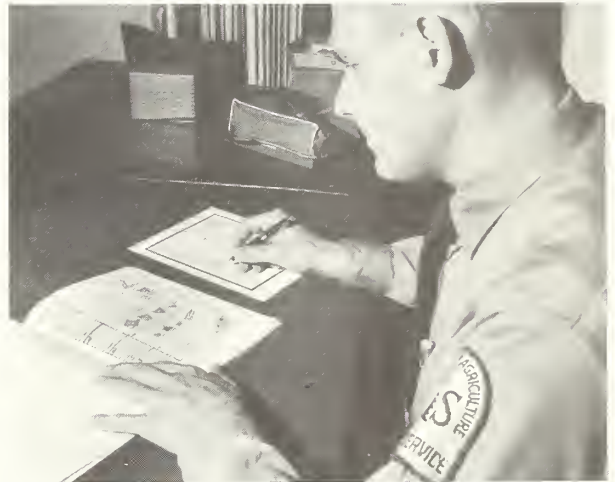
Programmed Learning
A Powerful New Training Tool



FOREST SERVICE, DEPARTMENT OF AGRICULTURE
Under the technical direction of the Division of Fire Control, U.S. FOREST SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

The programmed text is a new approach to fire control training.

This text trains more efficiently; it saves manhours and produces uniformly better results.



Application of this knowledge will save lives. It also serves as a foundation for making sound fire control decisions.

Figure K-3

(9) Structural improvements for fire and general purposes \$11,052,000

No program increase is proposed for fiscal year 1966.

Many Ranger District headquarters and field projects are located in remote areas or small communities where adequate housing is not available. Unless adequate housing is provided, it is not possible to headquarter needed personnel at these work locations. Program costs are increased excessively and the job of managing the lands and serving the public would suffer severely. There is also an urgent need for additional fire control structures such as aerial bases, service buildings, and offices in outlying locations.

Adequate communications facilities are essential for National Forest protection and administration. Obsolete telephone systems are being converted to radio networks. Inadequate radio systems are being improved to meet communications needs.

Landing fields, helispots, and heliports are highly essential to the effectiveness of the fire control program and multiple use management of the National Forests in making the best use of aerial operations and air equipment. They greatly facilitate rapid initial attack on forest fires, thereby increasing the chance for early control at small size which would result in a reduction of both suppression costs and resource losses. Construction and reconstruction of airport facilities, such as airports, airfields, heliports, and helispots are urgently needed.

The following facilities would be constructed in fiscal year 1966:

Dwellings and barracks	65	\$1,150,000
Fire lookouts	20	200,000
Service and storage buildings	90	1,792,000
Airstrips and helispots	170	300,000
Betterment of existing structures, site improvements, landscaping, and other miscellaneous construction		600,000
Water supply and sewer systems		500,000
Site acquisition		100,000
Communication facilities		1,050,000

Major structures:

Arcadia Equipment Development Center, California	130,000
Redmond Air Base, Oregon	100,000
West Yellowstone Air Base, Montana (Forest Service share for a fire control air attack base which will be built and used jointly with the Park Service of the Depart- ment of the Interior)	130,000

Construction and Maintenance of Structural Improvements

Construction funds were used to provide new buildings and facilities to meet the most urgent needs of the expanding National Forest programs. Emphasis continues on construction of dwellings and barracks to provide housing and crew quarters at locations where private rentals are not available to meet the needs. Field headquarters offices are being provided and obsolete offices replaced to provide adequate working space. Construction of service buildings such as warehouses, shops, and storage buildings at Ranger Stations has proceeded to fill the most urgent program needs. In addition to financing available from regular Forest Service appropriations, Accelerated Public Works funds were used for construction and maintenance of structural improvements. (See Figures L-1 and L-2.)

Following is a summary of the major fiscal year 1964 accomplishments (including all funds):

	<u>Number of Units</u>	
	<u>Construction</u>	<u>Betterment</u>
Dwellings and Barracks	195	120
Fire Lookouts	55	31
Service and Storage Buildings	347	176
Airfields, Heliports, and Helispots ...	1,004	61

The rate of progress is less than is needed to provide adequate facilities in a timely manner. There are 521 Ranger Districts needing additional housing for 2,405 employees presently working but living in unsatisfactory private housing or with long commutes. At the rate of construction from fiscal year 1963 to 1965, it would take 24 years to construct housing to meet present needs and expected expansion to 1972. Similar needs exist in service and storage buildings and fire lookouts.

Approximately 36% of the 1964 construction was done with National Forest Protection and Management funds, 60% from Accelerated Public Works, and 4% from other appropriations.

High priority maintenance was accomplished on existing general administrative improvements, consisting of 1,870 fire lookouts, 5,800 dwellings, barracks, and cabins, 700 offices, 6,800 service buildings and related utility systems, and airports.

The communication network was improved by addition of radiophones. Maintenance was provided for 19,500 radiophones and approximately 15,000 miles of telephone line.

It is planned to construct the following facilities in fiscal year 1965 with these funds:

Dwellings and Barracks	51
Fire Lookouts	21
Service and Storage Buildings	72
Airfields, Heliports, and Helispots	421



Fire control aerial bases at Redmond, Oregon, (above) and Redding, California, (below) are centers for air operations for the Forest Service in the far west. Such centers are essential to the effectiveness of the fire control program.



Figure L- 1



Replacement of obsolete towers with modern lookout stations is necessary to provide adequate working space and to improve the efficiency of the fire control organization.



Helispots are developed for fast fire attack and supply in back country areas.



Employee barracks must be provided at outlying locations where other housing is not available.

Figure L-2

(10) Payments to Employees' Compensation Fund \$669,000

An increase of \$54,000 for Bureau of Employees' Compensation is required to reimburse the Employees' Compensation Fund, Department of Labor, in accordance with P.L. 86-767 (5 U.S.C. 785), which was enacted September 13, 1960, for benefit payments made from that fund to employees of the Forest Service who are injured while in the performance of duty. The 1966 payment will be \$688,586. The payment for 1965 will be \$614,581.

Project (11)

(11) Water Resource Development Related Activities \$4,532,000

An increase of \$2,645,000 would be used to meet the most pressing Forest Service costs associated with water resource development projects built by other agencies within the National Forest to achieve the Administration policy of optimum multi-purpose development. These financial obligations are project-induced in a time sequence and proportion-different from and greatly in excess of that provided for in the Development Program for the National Forests.

Attainment of this objective requires a detailed analysis of the interrelationship between a project proposal and the multiple use property within which it is situated. It requires provision for public access, use and management facilities, sediment reduction and improved water control capability on tributary lands and similar activities necessary to optimize the purpose of the water and related land resource project.

The work proposed for accomplishment during fiscal year 1966 includes:

1. Comprehensive field analysis and reports of the effect of each proposed water development project on all land related resources and activities, prescribe the measures needed to maximize project benefits, and furnish liaison with the construction agency on projects under construction (Figure M-1). Some of the major projects are Libby in Montana, Dworshak and High Mountain Sheep in Idaho, Ruedi in Colorado, Maxwell in Arizona, Joes Valley in Utah, Bullards Bar in California, Allegheny in Pennsylvania, Royal Glen in West Virginia, Lauren Shoals in Georgia, Toledo Bend in Texas and Louisiana and Patoka in Indiana.
2. Provision of public access, use and management facilities on major water resource development projects completed or nearing completion such as Ruedi in Colorado, Mogollon Rim Lakes in Arizona, Flaming Gorge in Utah, Shasta-Trinity in California, Allegheny in Pennsylvania, Sam Rayburn in Texas, and Monroe in Indiana.
3. Improvement of soil and cover condition on lands tributary to selected water resource development projects to reduce sediment and modify water yields to increase the effectiveness of the project installation and prolong its useful life (Figure M-2).

Construction liaison expedites the work of the construction agencies, insures proper installation of project facilities, and reduces resource losses and interference with regular protection and management activities of the Forest Service. Among the projects for which construction liaison was furnished in fiscal year 1964 were Allegheny, Packwood, Sam Rayburn, Monroe, Blue River, Upper American River, and Toledo Bend.

Public Access, Use, and Management Facilities

Major emphasis was placed on developing public access and use facilities at Flaming Gorge, Allegheny, Shasta, and Trinity Reservoirs during 1964. Some funds were reprogramed to permit initial development of these major reservoirs. Approximately 10% of the total Forest Service recreation facility construction expenditure in fiscal year 1964 was at reservoirs.

Even though a substantial share of the National Forest recreation facility construction budget was allocated to water resources development projects, this effort financed only a small part of the needed public access and use facilities. Additional facilities are needed at Flaming Gorge, Allegheny, Shasta, Trinity, and Lewiston Reservoirs and many other existing reservoirs do not have facilities to accommodate the public use they are attracting. Several major reservoirs under construction create an additional need for public access and use facilities.

Soil Stabilization and Cover Improvement

Funds available in fiscal year 1964 were insufficient to improve conditions on lands tributary to most water resource development projects and only a nominal amount of such work was done.

Treatment is needed at several projects to reduce sediment production and improve water control capability on tributary lands. This work will prolong the useful life of the water resource developments and improve the quality of water for recreation, fish, and other purposes.

Examples of Recent Accomplishments

There has been a large increase in major water resource structures involving National Forest lands in recent years. These projects are being constructed by the Bureau of Reclamation, Corps of Engineers, Federal Power Commission licensees, and various State agencies. There were 122 existing major water resource development projects under construction at that time. In addition to those under construction, 202 new major project starts may be made by 1970 and consequently must be planned for. Our present rate of progress has fallen far short of that necessary to synchronize land management activities of the Forest Service with water resource developments.

The construction agency usually replaces existing facilities, such as roads and other improvements impaired by the project. However, the planning, construction, and operation of a new major water development project creates a massive impact on adjacent National Forest lands which is not and cannot be completely alleviated by the construction agency. Substantial modification of multiple use management programs is required.

Project (11)

Multiple Use Impact Surveys and Construction Liaison

During fiscal year 1964 the Forest Service completed multiple use impact surveys and reports and performed construction liaison on 31 major water development projects. The multiple use surveys produced:

1. An analysis of the relationship between the National Forest and the water development project and the changes required in National Forest management to obtain maximum public benefit from the project.
2. An analysis of possible adverse effects on National Forest resources and multiple use management and the measures necessary to protect these values.
3. An evaluation of opportunities derived from the project to enhance multiple use management of the National Forest.
4. An analysis of the problems affecting the National Forest which may arise during the planning, construction, and operation of the project.
5. A plan for incorporating these findings into the design, construction, and operation of the water resource project.

Among the projects for which multiple use surveys were made in fiscal year 1964 are High Mountain Sheep, Ruedi, Lower Grande Ronde, North-Middle Fork Stanislaus, Middle Fork Snoqualmie, Grizzly Valley, Upper Snake, Alta, Cochiti, Cabin Cree, Antilon, Laurens Shoals, Libby, Lee Creek, Oil Creek, Pi Pi, Middle Fork Feather, Toledo Bend, Mossy Rock, Walker, and White Salmon.

WATER RESOURCE DEVELOPMENT RELATED ACTIVITIES



Full-time liaison with the construction agency is required on major projects for coordination with National Forest programs.

Figure M-1

WATER RESOURCE DEVELOPMENT RELATED ACTIVITIES



Sediment reduction and improvement of water control capability on selected tributary lands is essential to maximizing the effectiveness of a water resource development project.

Figure M-2

(12) Fighting Forest Fires \$5,000,000

No program increase is proposed for fiscal year 1966.

This program provides for forest firefighting on the National Forests and Grasslands. It permits employment of emergency forces when weather conditions are severe. The costs for the regular fire protection organization are paid from the National Forest Protection appropriation. When critical fire conditions occur, it is regular practice to build up temporary forces in the most threatened areas. Long experience shows that material savings are made by having such a strengthened force ready to discover and attack fast-spreading fires. Damage and suppression costs are thus materially reduced over what might be expected from normal crew strength.

The calendar year 1963 fire season. The southern and eastern regions of the country had drought conditions that resulted in a severe fire season in both the spring and fall. The spring of 1963 in this area was probably the most critical of the past 20 years.

The western fire season in 1963 was late because of favorable weather. Montana, Idaho, and Utah had dry conditions with heavy lightning activity. Early fall rain, especially in southern California, reduced fire danger and the usual fall season did not materialize.

There were 12,740 fires that burned 127,571 acres on the National Forests and Grasslands in 1963. This was up from the all-time record low year of 1962 when 85,457 acres burned, but it is well under the five-year (1958-62) average of 227,841 acres.

Man's activities caused 6,269 of these fires. This is a significant increase over 1962, when there were 5,193 man-caused fires. During the 1958-62 period there was an average of 4,789 man-caused fires.

There were only two fatalities connected with firefighting activities in 1963. An air tanker pilot was killed in California and a firefighter was hit by retardant in Montana.

The calendar year 1964 fire season. The Eastern spring fire season was normal or below in most areas. There were 2,100 forest fires through October that burned 25,000 acres. This compares to the five-year average of 2,257 fires that burned 32,243 acres for the same period. The number of man-caused fires through October in the East was 1,800. This is a substantial reduction from 1963 when 3,244 fires had been started by man through October.

The Western fire season, including Alaska, was normal or below through October despite the fact that drought conditions prevailed through parts of Oregon and California. There were 6,700 fires that burned 166,000 acres through October. The five-year average shows 9,485 fires burned 190,024 acres during the same period.

Project (12)

There were five firefighting fatalities recorded through October 1964. Two air tanker pilots were killed in separate accidents. A helicopter pilot was killed when returning from delivering a firefighter to a fire. One firefighter was fatally burned and another walked into helicopter rotor.

There was a total of 8,800 fires on the National Forests and Grasslands that burned 191,000 acres through October. This compares favorably with the 1959-63 five-year average of 11,742 fires that burned 222,267 acres.

(13) Insect and disease control \$12,575,000

An increase of \$1,800,000 for control of forest insects and diseases other than white pine blister rust would be used: (a) to find substitutes for DDT, a persistent chlorinated hydrocarbon pesticide, now widely used against defoliators and the cause of mounting public concern; (b) to place less reliance on broad spectrum chemicals and greater reliance on more expensive non-persistent selective pesticides; and (c) to expand monitoring services on aerial spraying projects.

As the use of DDT is phased out, control of defoliating insects with non-persistent insecticides will be several times more expensive. For example, non-persistent insecticides currently cost about three times more; application by helicopter for greater accuracy of spray deposit costs about three times more than application by fixed-wing aircraft; monitoring of the environment to determine residues and adverse effects of pesticides will be greatly expanded and will be costly; and the search for and testing of substitutes for the persistent DDT must be sharply expanded and accelerated.

Following are the 1966 objectives for the white pine blister rust control and the other pest control programs:

DISEASE CONTROL

1. White Pine Blister Rust Control
 - (a) Perform maintenance surveys on 1,940,000 acres
 - (b) Eradicate ribes bushes from 220,000 acres
 - (c) Apply antibiotic fungicides to 17,000,000 trees
2. Oak Wilt Control
 - (a) Surveys of oak forests to locate infected trees 47,000,000 acres
 - (b) Destroy or treat infected trees 5,000 trees
3. Dwarfmistletoe Control
 - (a) Intensive surveys on pine stands to locate infected trees 225,000 acres
 - (b) Control disease on 3,000 acres
4. Other Disease Surveys 128,000 acres

INSECT CONTROL

1. Bark beetle control -- Treat infested trees, cull logs, stumps, and slash 1,400,000 units
2. Defoliator control -- Aerial application of insecticides on 920,000 acres
3. Plantation insect control -- Aerial or ground treatment on 25,000 acres

Project (13)

OBLIGATIONS, INSECT AND DISEASE CONTROL FUNDS
(Exclusive of White Pine Blister Rust Control)
FISCAL YEAR 1964 AND ESTIMATES FOR FISCAL YEARS 1965 AND 1966

Project	1964	1965 (estimated) 1/	1966 (estimated) 1/
<u>Forest insects feeding on or under the bark 2/</u>			
Northern Rocky Mountain States	\$21,101	\$40,000	\$50,000
Rocky Mountain States	1,442,072	810,000	767,000
Southwestern States	150,567	151,000	90,000
Intermountain States	1,697,106	762,000	700,000
California	309,489	300,000	300,000
Pacific Northwest States	14,650	10,000	20,000
Eastern States	13,031	10,000	10,000
Southern States	739,237	400,000	546,000
<u>Forest insects feeding on cones, seeds, buds, shoots, or foliage 3/</u>			
Northern Rocky Mountain States	295,672	410,000	1,000,000
Rocky Mountain States	- -	5,000	200,000
Southwestern States	6,495	50,000	347,000
Intermountain States	485,505	420,000	1,114,000
California	8,499	150,000	150,000
Pacific Northwest States	78,240	29,000	140,000
Eastern States	27,699	10,000	10,000
Southern States	- -	- -	10,000
North Central States	18,762	50,000	50,000
Alaska	5,200	- -	- -
<u>Forest tree diseases 4/</u>			
Northern Rocky Mountain States	20,100	40,000	40,000
Rocky Mountain States	12,000	6,000	6,000
Southwestern States	500	11,000	11,000
Intermountain States	10,502	6,000	6,000
California	63,954	100,000	100,000
Pacific Northwest States	62,499	70,000	70,000
Eastern States	107,448	65,000	65,000
Southern States	22,899	43,000	43,000
Alaska	20,100	- -	- -
<u>Detection and evaluation</u>	981,561	990,000	990,000
<u>Cooperative surveys with States</u> ...	58,300	240,000	240,000
<u>Methods improvement 5/</u>	60,000	175,000	225,000
<u>Equipment development</u>	40,930	52,000	75,000
<u>Forest Pest Control Act adminis-</u>			
<u>tration</u>	717,060	830,000	830,000
<u>Department of Interior forest in-</u>			
<u>sect and disease projects</u>	1,036,231	900,000	730,000
Total available or estimated	8,527,409 6/	7,135,000	8,935,000

- 1/ Estimates of project needs are forecast a year or more in advance of anticipated needs and are always subject to fluctuations. Adjustments are made between projects as necessary, depending on discovery of new outbreaks and expanded needs on approved projects.
- 2/ Includes Black Hills, mountain pine, western pine, southern pine, Engelmann spruce, black turpentine beetles, Ips, flatheaded borers, balsam woolly aphid, and scale insects.
- 3/ Includes spruce budworm, jackpine budworm, Douglas-fir tussock moth, elm spanworm, sawflies, Saratoga spittlebug, European pine shoot moth, white pine reproduction weevil, seed and cone insects.
- 4/ Includes oak wilt, dwarfmistletoe, and Fomes annosus root rot.
- 5/ This item provides for initial implementation of a chemical pesticide screening unit, jointly financed with Forest Pest Control Act and Research funds. Work on the unit was started January 2, 1964, and will be further expanded in fiscal years 1965 and 1966. Its purpose is to screen and field test selective non-persistent chemicals in search of replacements for persistent chemicals currently used in forest insect control.
- 6/ Includes \$1,672,261 of the fiscal year 1963-1964 supplemental appropriation.

Project (13)

Examples of Recent Accomplishments

a. White Pine Blister Rust Control

Control by spraying antibiotic fungicides was stepped up in North Idaho. Approximately 17½ million western white pine trees on 117,500 acres were treated by applying antibiotic fungicides to foliage by aircraft or to the basal stem by hand equipment.

Control by eradicating ribes (alternate plant host of the disease) was continued in the Northeast, North Central, and Pacific Coast States.

Surveys to locate areas in need of treatment and to plan control action covered 3,000,000 acres.

Eight and one-half million ribes plants were removed from 241,000 acres.

b. Control of Forest Insects and Other Diseases

Insect and disease control on non-Federal forest lands strengthened by new Federal-State cooperative programs. A model cooperative agreement was drawn up to establish with States a continuing program of surveys and control of forest insects and diseases on non-Federal land. Twelve States organized programs under provisions of the new agreement. Six more are ready to organize such programs as soon as agreements can be completed and funds are available.

Pesticidal evaluation and screening unit established at Berkeley, California. The search for non-persistent pesticides for use in controlling forest insects was intensified by establishing an evaluation and screening unit at Berkeley, California. The non-persistent materials showing promise through research studies in the laboratory will be pilot tested under operating conditions in the field.

Monitoring was intensified on areas aerially sprayed with insecticides. To verify and establish the effectiveness of precautions and safeguards taken in aerially applying insecticides, samples of fish, wildlife, meat, milk, and water were analyzed before, during, and after spraying operations to determine amounts and effects of insecticide present. (See Figure N-1.)

Aerial insecticide application methods were modified to insure correct placement and dosages in sensitive areas. Fourteen percent of all aerial spraying was done by helicopter to prevent or minimize drift of insecticides into water and onto agricultural land. Strips of land near water courses were left untreated; dosage rates were reduced near sensitive areas; and supervision of project operations was intensified to reduce possible accidental dumping, misplacement, and overdosage. (See Figure N-2.)

Spruce budworm epidemics controlled in Idaho, Montana, and Maine. Spruce budworm infestations occurred on approximately four million acres of mixed conifer forests in Maine, Idaho, Minnesota, and Montana. In addition, a new infestation of about 100,000 acres was discovered in New Mexico. To prevent severe damage to forest resources, 50,000 acres of private land were aerially sprayed in Maine; 527,000 acres on the Salmon National Forest in Idaho; and 156,000 acres on Lolo and Deerlodge National Forests in Montana. (See Figure N-2.)

Bark beetle outbreaks checked in the West, South, and Southeast. Good progress was made in controlling extensive outbreaks of tree-killing bark beetles by burning, chemically treating, and logging infested trees. Nationwide, 1.5 million trees were burned or treated with chemicals. These control measures, aided by improved precipitation, and concerted salvage-logging have checked the Mother Lode epidemic in California; the threat of an epidemic in the Pacific Northwest caused by the extensive 1962 blowdown in Douglas-fir; the long-standing infestation on the Wasatch National Forest in Utah, and the widespread infestations that developed in 1962 and 1963 in the South and Southeast. Needing special control effort in 1965 are epidemics in the Black Hills of Wyoming and South Dakota and on the Teton and Targhee National Forests and Grand Teton National Park in Idaho and Wyoming. (See Figure N-3.)

European pine shoot moth spread in Northwest slowed by quarantines and eradication. A zone of containment against the European pine shoot moth was again maintained around infested areas in western Washington. Area outside this zone in Washington and Oregon was systematically searched for spot infestations. One new infestation, found in a nursery at Portland, Oregon, was promptly eradicated.

Douglas-fir tussock moth populations increasing in the West. Surveys reveal the threat of serious outbreaks of Douglas-fir tussock moth in California, Oregon, Idaho, and Nevada. Infestations are being evaluated to determine the degree of predation and parasitism. If these natural control factors are insufficient to keep population in check, direct control will be necessary in 1965.

The larch casebearer continued its spread in western Montana, north Idaho, and northeastern Washington. Large numbers of a highly effective parasite of the larch casebearer were introduced into infested stands in portions of Montana, Idaho, and Washington. The parasites are known to have become established and the additional introductions will hasten their spread throughout the infestation areas. (See Figure N-2.)

Dwarfmistletoe control accomplished in conjunction with timber harvesting and timber stand improvement activities. To accomplish control through such activities, surveys are needed to learn the distribution and intensity of the disease. A total of 164,000 acres, all on National Forests, was examined for this purpose.

Cooperative Federal-State program to control oak wilt continued. Six States -- Pennsylvania, Virginia, West Virginia, Kentucky, North Carolina, and Arkansas -- participated in programs to control oak wilt, a disease of oak trees. A total of 42 million acres was aerially surveyed to locate infested trees; 5,854 were found and treated.

DEPARTMENT OF THE INTERIOR
(Forest pest control activities under funds transferred
from the Department of Agriculture for insect and
disease control)

Introduction

Approximately 182 million acres of forest and woodlands are administered by the Department of the Interior; including 8.3 million acres by the National Park Service, 2 million acres by the Bureau of Sport Fisheries and Wildlife, 13.1 million acres by the Bureau of Indian Affairs and 159.8 million acres by the Bureau of Land Management. Prevention of serious losses from disease and insects on these forest lands is an important activity under the Forest Protection program.

Control Accomplishments in Fiscal Year 1964 - Blister Rust.

There are about 550 thousand acres of blister rust control areas administered by the Department of the Interior of which 380 thousand are under the direction of the National Park Service, 100 thousand under the direction of the Bureau of Indian Affairs, and 70 thousand under the direction of the Bureau of Land Management.

Bureau of Land Management control work involves three methods:

1. Alternate host (Ribes) eradication
2. Use of antibiotics to control blister rust in Sugar Pine trees
3. Development of rust resistant Sugar Pine seedlings through controlled pollination.

The use of antibiotics in infected trees, and the development of rust resistant seedlings from controlled pollinated seeds, appear to have good possibilities in improving the management and production of Sugar Pine stands.

The National Park Service conducts White Pine blister rust control in 15 national parks containing over 380 thousand acres of control area. Control is by eradication of Ribes or using antibiotics, whichever is more practical for the area.

On much of the Bureau of Indian Affairs 100 thousand acres of control area, the work of eradicating Ribes is accomplished by Indian work crews. This is done on reservations in Minnesota, Michigan, and Wisconsin.

Insect and Other Diseases

The outbreaks of pine bark beetles have increased to epidemic stages in many areas during the past year, requiring more intensified efforts if the epidemics are to be controlled.

The National Park Service has pine beetle control projects, either new or continuing, in Grand Teton, Lassen Volcanic, Yosemite, Sequoia, King's Canyon, Rocky Mountain and Wind Cave National Parks; and Devil's Tower, Jewel Cave, and Mount Rushmore National Monuments.

The Bureau of Land Management has pine bark beetle control projects, either new or continuing, in Colorado, Wyoming, and South Dakota.

Excellent results have been reported in pine bark beetle control where treatment has been completed.

The Bureau of Indian Affairs has continued control of dwarfmistletoe infections on Limber Pine in the Mescalero Indian Reservation in New Mexico.

Spruce budworm, which is epidemic over an extensive forest area in Idaho and Montana, involves some BLM lands in both States. Damage is severe in some places. Current Department of the Interior policy prohibits use of DDT, a persistent pesticide, and DDT is presently the only effective insecticide against spruce budworm. Control is, therefore, being temporarily deferred, pending further studies of alternative methods.



Fish-shocking devices for counting purposes were used in Idaho in monitoring the possible adverse effects of DDT to fish, resulting from aerial spraying for control of the spruce budworm.



The effectiveness of a charcoal filter for removing persistent pesticides from water was tested in conjunction with aerial spraying for control of defoliating insects.

Figure N - 1



Helicopters are used extensively in aerial spraying for control of forest insects to prevent possible spray drift into streams, lakes or pasture land.

Spruce budworm larvae are carefully counted on twig samples to assess the effectiveness of spraying for control.

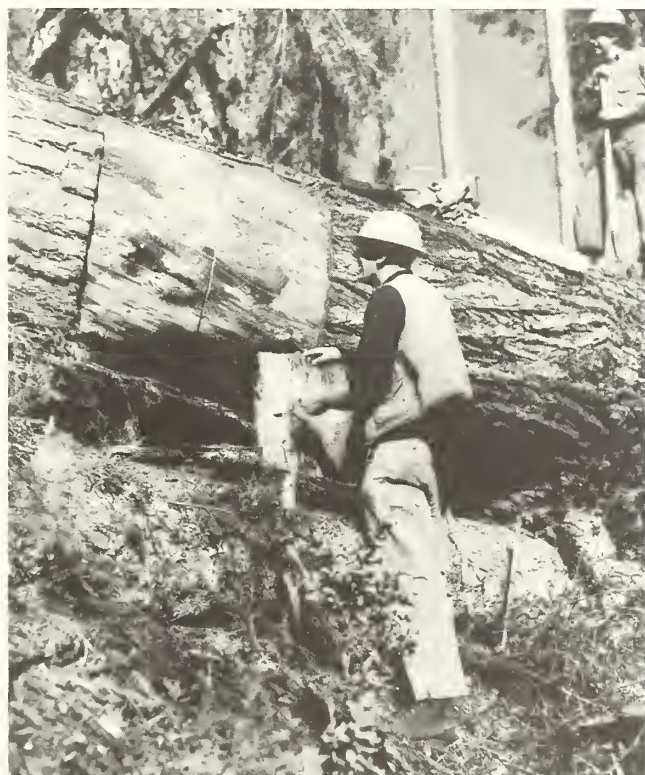


Larch casebearer larvae overwinter in cigar-shaped cocoons. Large numbers of parasites were introduced into casebearer-infected stands in Montana, Idaho and Washington to effect biological control.

Figure N-2



The salvage of windthrown Douglas-fir from the coastal forests in Oregon and Washington reduced the threat posed by beetles to green standing trees in affected stands.



Periodic sampling of windthrown Douglas-fir timber is necessary to determine need and timing of salvage-logging for control of the Douglas-fir bark beetle.

Figure N - 3

(14) Acquisition of Lands (Weeks Act) \$680,000

No program increase is proposed for fiscal year 1966.

Funds would be used to purchase about 27,500 acres of land. Actionable offers from private landowners anxious to sell their properties far exceed the amount that could be purchased with these funds.

The objective in the present 10-year period (1963-1972) is to purchase 967,000 acres of key inholdings of land for National Forest purposes. These are lands valuable for watershed and timber production purposes. This estimate of program needs excludes land primarily valuable for recreation purposes.

The highest priority tracts for purchase include key tracts of inholdings which fill in irregular ownership patterns in present National Forests and provide more efficient management, protection and administration of water and wildlife resources.

Examples of Recent Accomplishments

Weeks Act purchases approved in fiscal year 1964 by the National Forest Reservation Commission involved 257 properties containing 26,699 acres in 15 National Forests located in 14 States. The approved prices averaged \$34.08 per acre. Included in these acres were 148 tracts needed in special Skyline Scenic Drives in Arkansas, Oklahoma, and Georgia. These latter tracts will, in some instances, require initiation of condemnation actions. Two such actions involving 15 properties were prepared and filed in fiscal year 1964.

Approximately 17,000 acres will be purchased in fiscal year 1965. This includes properties needed for completion of the Skyline Drive Project in Arkansas-Oklahoma, Ouachita National Forest. An outstanding property having frontage on the Black River, Clark National Forest, will also be acquired. \$80,000 and \$100,000 respectively was provided by the Congress for these two projects.

ACQUISITION OF LANDS (WEEKS ACT)



An example of the continued need for Weeks Law acquisition. All marketable timber, pulpwood and sawtimber have been cut. The landowner is planning to use this steep, erodible hillside as pasture which will add to siltation problems now existing in the area. Erosion rills are already forming resulting in siltation of the Jackson River, Virginia (Photo below).



The headwaters of this beautiful river must be protected to maintain a stable stream flow and water purity, and to prevent damage to the fishing resource through siltation of spawning beds.

Figure N-4

(15) Timber Management Research \$7,546,000

A decrease of \$141,000 is made possible by closing out research projects in hardwood silviculture in New Jersey and Indiana and tree physiology studies in California. This reduction is made to achieve economies in the overall program and to provide for consolidating small isolated projects at locations with a better scientific environment and more adequate research facilities.

Timber management research develops cheaper and more effective methods of establishing, managing, and improving forests for the production of timber and timber-related products. The core of this research is determining the proper culture for over a hundred different commercial timber species in the United States. This silvicultural research includes seed production, seeding, planting, thinning, pruning, and stand regeneration measures. It involves the control of brush and other competing vegetation, and the protection of the new stand from animals. Other phases of the program deal with soil and site improvement for timber production, and the development of improved strains of trees through selection and breeding of superior types.

Timber management research also provides forest managers with information on the yield of forests in terms of various products such as lumber, plywood, poles, piling, and pulpwood, and the influence of cultural practices on the yield and quality of the stand. The program also includes research on methods of producing timber-related forest crops such as gum naval stores, maple sap, Christmas trees, and other income-producing natural products from forests.

This production-oriented research is backstopped by fundamental research on the physiological growth requirements of forest trees, on variation and inheritance in tree characteristics that have economic value, and on new approaches to difficult measurement problems involved in the management of forest properties.

In all of this research the aim is to meet the Nation's need for production of timber and related forest crops. In view of the inroads on forest lands being made by urban expansion, highways, parks, and other developments, these future needs will not be met at reasonable cost unless technological progress in timber management is increased. Better methods must be found to reforest deforested acres, to keep existing forest lands continuously productive, to reduce the cost of growing the crop, and to increase its value for industrial use.

Examples of Recent Accomplishments

Sweeter sugar maple trees are selected for breeding. The cost of producing each gallon of maple syrup is closely tied to the sugar content of the sap, and it has been shown that sweetness in sugar maple sap is inherited. By 1962, criteria had been developed to grade sugar maple trees for sugar content and other desirable characteristics. Individual analyses of sap from more than 2,000 trees that year led to selection of 35 trees that were at least 50% above the average in sweetness. Using improved methods in initial selections during 1963, 3,300 trees were screened and 84 were found with substantially higher sugar yields than nearby trees. Some trees have been located that have 8% sugar content in the sap, in comparison with an average of 2-1/2%. State groups have been organized in Maine, Massachusetts, New Hampshire, Vermont, and New York to screen sugar maple trees for sweetness and other desirable traits. The superior individuals are being used as the basis for a breeding program to develop superior stock. (See Figure O-1.)

Repellent coating for direct seeding improved. A new and improved repellent coating for direct seeding, containing Arasan 42-S, has been developed at Alexandria, Louisiana. It is easier and simpler to apply and more durable than the coatings used previously, and it is well suited for hand seeding operations because it gives off no chemical dust. Arasan 42-S is an aqueous suspension of thiram, the chemical that has been used in powder form as a bird repellent since 1955. Though nontoxic at normal levels of exposure, thiram is a skin irritant, and hence the task of handling seed treated with the dry powder is disagreeable. Pilot-scale trials, ranging in size from 50 to 600 acres, demonstrated that the new material can be applied rapidly, that seed flow through various types of metering devices is not adversely affected, and that durability under field conditions is superior to that of the powder. While safeguards must be observed in mixing the formulation, the coated seed can be handled at loading sites without discomfort caused by thiram dust. Arasan 42-S is recommended, therefore, to replace both Arasan 75 and sublimed synthetic anthraquinone.

Unique climatic conditions control seeding in Southwest. In the ponderosa pine forests of the Southwest where growing conditions are severe due to drought and low temperatures during most of the year, new pine seedlings have to send down taproots 1 to 2 feet long during the brief rainy season of July and August in order to survive. A study by the Rocky Mountain Station showed that by the time growth stopped in the fall seedlings from seeds that germinated before July 22 were five times as heavy and had taproots nearly three times as deep as seedlings established later. Differences in size

were significant between seedlings that started only one week apart. Date of germination far overshadowed the minor effect of seed size on seedling size. Root extension was very rapid during the warm days of mid-summer, but very little growth occurred after the first fall frosts early in September. Seeds from ponderosa pine growing in the Southwest differ from other geographic sources in that they will not germinate below a sustained temperature of 60°F. This adaptation prevents germination until the characteristic mid-summer rains occur. With this knowledge, it will be possible to plan and time direct seeding operations for greater success.

Methods developed for successfully propagating yellow-poplar and sweetgum. Until recently, no methods of vegetative propagation were available for these two valuable upland hardwoods. For yellow-poplar, success was attained by using the apparently juvenile sprouts from stumps of trees too old to root from branch cuttings. Nearly all of the cut sprouts rooted and grew rapidly in height. The sprout cutting method which worked so well with yellow-poplar did not work with sweetgum. For this species, success was attained with root cuttings, which were induced to bud and produce new trees once optimum conditions for rooting and growth were determined. These new methods show promise for multiplying selected superior trees.

Radioactive phosphorus traces tree pollen flight. The extent to which pollen mixing occurs in forest stands is a key factor in the development of seed orchards. In some species inbreeding, as might occur among members of the same clone in a seed orchard, produces progeny with depressed growth rate. In a P.L. 480 project in Finland, radioactive phosphorus was injected in trees just before pollen was mature and the developing pollen accumulated the phosphorus. Collecting slides were placed in the stand to sample the pollen. This study showed the pattern and distance covered by the radioactive pollen, and will serve as a guide in planning future seed orchards composed of different clones of trees.

Resistance of longleaf pine to needle disease inherited. Regeneration of longleaf pine is hindered by the brown-spot disease, but a high degree of resistance to this disease has been found in some longleaf pine seedlings in Louisiana. These were the progenies of a tree which was found as a disease-free seedling in 1937. Wind-pollinated seed from this tree produced seedlings that had only about 10% of infected foliage compared to about 50% infection in ordinary stock. These observations indicate genetic control of the resistance to brown-spot in longleaf pine seedlings and provide hope that further selections for resistance will be successful. (See Figure O-2.)

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Hybrid poplars grow well on mine spoil banks. The reclamation of strip-mined land is being speeded by hybrid poplars which have grown well on some sites on the spoil banks. Out of 50 hybrid poplar clones planted on two kinds of graded spoil banks in Harrison County, Ohio, more than a dozen have survived and grown well. The American eastern cottonwood, the European black poplar, and a species from east Asia were among the parents producing the best hybrids. In a screening study in Pennsylvania and West Virginia, of 60 different clones for spoil bank planting, the best hybrid grew 7 feet in 2 years. Survival and growth were poor on the very acid spoil banks, however. Special care must be taken in selecting planting sites to take advantage of the growth potential of the hybrid poplars.

Silvicultural methods control gum spot in cherry logs. Thinning prescriptions have been developed for improving stand quality in a number of hardwood types. Recent research has indicated that thinnings and other stand improvement methods should be valuable in reducing the incidence of gum spot, a serious defect in black cherry logs caused mainly by the *Prunus* miner whose larvae reach the main stem through the major branches. Suggestions for silvicultural control include: early weedings and stand-improvement thinnings in young stands, removal of large rough dominants of sprout origin from older stands, and development of new stands of black cherry in dense groups on sites below the zone of severe glaze damage.

New prescriptions improve chemical control of woody plants. One of the most useful recent developments in selectively killing unwanted trees to improve the forest is the use of the tree injector. New prescriptions have been developed which permit the use of cheaper chemicals and extend their use throughout much of the eastern United States. Large reductions in costs are in prospect through the use of undiluted 2, 4-D amine--a low cost chemical--instead of diluted 2, 4, 5-T ester. In the Lake States, a new systemic herbicide (4-amino-3,5,6-trichloropicolinic acid) is also proving more effective in injections than the standard 2,4,5-T. Recent injector trials in the Middle Atlantic Coastal Plain have confirmed the utility of tree injectors in that region. Although undiluted formulations have not proven as successful as in the South so far, tree injector recommendations for the use of both ester and amine forms of 2,4,5-T have been released. Many of these results are already in practical application with lowered production costs for the timber producer.

Boxelder blight traced to herbicide drift. For several years a leaf blight of undetermined origin has appeared on boxelder (*Acer negundo* L.) and occasionally on several other tree species of the Northern Great Plains. Growth loss and unsightly appearance have resulted in a decrease in the use of boxelder as a shelterbelt species. The appearance of blighted foliage and season of attack cast early suspicion on 2,4-D--an herbicide used extensively in this region as an aerial and ground crop spray. However, the widespread occurrence in many cases could not be directly associated with spraying on adjacent fields. Therefore, research on the cause of the blight also gave a check on herbicide drift. Studies involved the use of indicator plants sensitive to minute quantities of 2,4-D, root studies, and chromatographic analysis of blighted foliage. All indicated that 2,4-D was the cause of the blight. Also the research showed that extensive spraying operations in the general vicinity of boxelder plantings are likely to result in damage because this species is especially sensitive to 2,4-D.

Animal damage is related to terpenes in pines. The terpene constituents of pines and their hybrids may determine in part the susceptibility of trees to damage by mice. In a pine plantation, in Massachusetts, girdling by mice varied appreciably among the species. Some species were severely damaged, others lightly or not at all. Hybrids between those with severe damage and those with little or none were intermediate in incidence of damage. Among the species studied, the higher the amount of alpha pinene in the turpentine, the higher the proportion of trees damaged.

Sampling methods cut scaling costs. The cost of scaling all the logs in a timber sale sometimes is excessive and out of proportion to the value of the logs. In a study conducted by the Forest Service's Pacific Northwest Station in coastal Oregon it was found that scaling a randomly selected sample of truckloads not only amounted to considerable savings but resulted in highly acceptable accuracy standards when compared with total scaling. A second sampling method that involved weighing all loads and converting weight to board-foot scale by a converting factor determined from a sample scale proved to be slightly more accurate, but also more costly, than straight sample scaling. Both methods of sample scaling are expected to be widely used for the reduction of scaling costs.

Optical dendrometer and electronic computer reduce cost of timber inventory. A new procedure developed in research on timber measurements makes use of an optical dendrometer and an improved sampling system to obtain accurate volume estimates of timber stands at greatly reduced cost. Dendrometer measurements of tree height and diameters at several points along the stem are used directly in a high-speed computer program to produce tree volumes and supplementary information. The geometric principles of optical dendrometers, a description

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of the sampling system, and the computer program are contained in publications of this research. Detailed field evaluation of this revolutionary method of timber inventory is now underway.

A new guide to shelterbelt establishment and care is published. A comprehensive handbook on shelterbelts for the Great Plains was published this past year as a USDA Agricultural Handbook by the Rocky Mountain Forest and Range Experiment Station. Primarily for technicians, this handbook deals with the details of establishing shelterbelts as well as their effects on local climate and crops. Land preparation, species selection, planting, maintenance, and protection are all covered rather completely. This publication brings together information from past shelterbelt research and will be a valuable handbook for use throughout the Great Plains.

Desirable forest planting practice outlined for the Central States. A summary of latest available information on tree planting in the central hardwood region was published as Agricultural Handbook 247, Forest Service, USDA, under the title "Forest Planting Practice in the Central States". It contains detailed discussions and tables on where to plant, what to plant, how to plant, and how to protect the plantations. Although it will be of value to all who are interested in planting trees in the Central States area, it will be particularly valuable to extension foresters, farm foresters, forest rangers, consulting foresters, county agricultural agents, soil conservationists and others to whom landowners usually go when seeking advice on tree planting.



SELECTING AND BREEDING SWEET SUGAR MAPLE TREES

MEASURING SUGAR CONTENT OF SAP

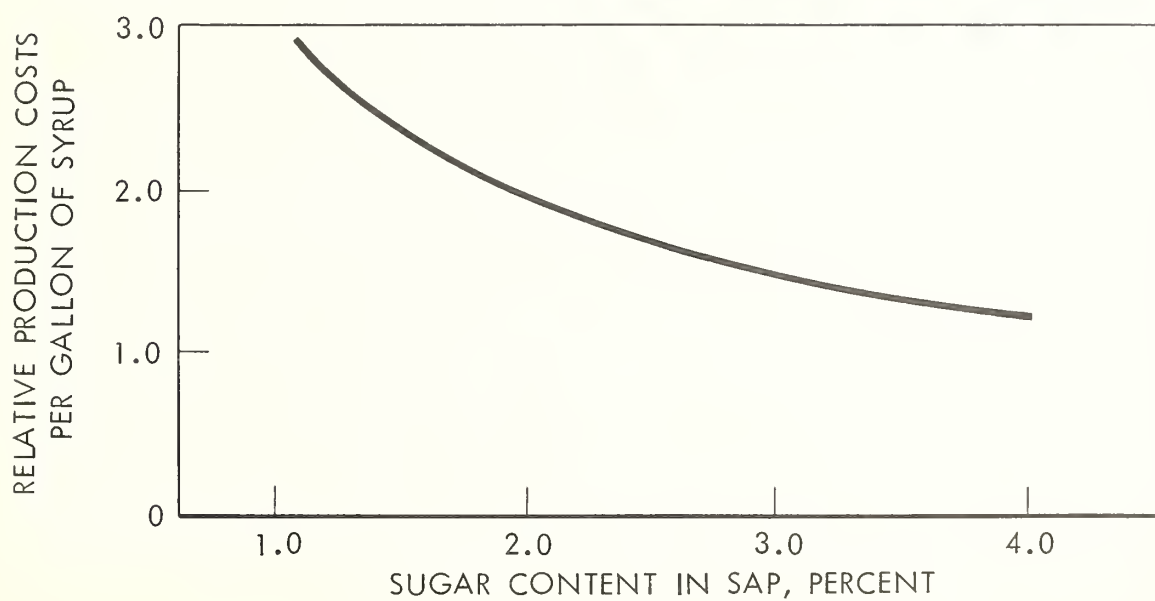


Figure O-1

SELECTING AND BREEDING BETTER PINES



(A)



(B)



(C)

Breeding trees for resistance to various pests and for specific environments is a major part of the forest genetics and tree improvement program. Photograph A shows 5-year old slash pine badly infected with fusiform rust in the foreground and well-formed, non-infected trees in the background. The latter are the progeny of trees selected for good form and rust resistance. Photographs B and C show 8-year old slash pine trees badly bent or broken by ice (B) and trees only slightly damaged (C), which are expected to recover. The latter are the progeny of trees selected for narrow thin crowns, a characteristic which resists damage by ice storms. This research is being conducted in Georgia.

Figure O-2

(16) Watershed Management Research \$3,130,000

A decrease of \$21,000 will result from closing one project aimed at developing principles for managing municipal watersheds in the mid-Atlantic states. This project will be consolidated in the near future with other research at the new headquarters laboratories of the Northeastern Forest Experiment Station at Radnor, Pennsylvania, now being planned. Greater efficiency in support services will result.

Watershed management investigations are aimed at development of methods and techniques for managing forest and related range watersheds to: (a) increase water yields or improve the timing of water yields under a variety of climatic, soil, geologic, vegetative and topographic conditions by changing the pattern, density or type of forest cover; (b) give adequate protection to soil and water resources while forest and related rangelands are being used for timber production, grazing of domestic livestock and big game, wildlife habitat and forest recreation; (c) rehabilitate forest and related rangeland watersheds that constitute serious sources of damaging flood runoff and sediments; and (d) aid forest soil development and improvement.

Between half and three-fourths of the water flow of the United States originates in forests, associated rangelands and alpine regions which form the headwaters of all major river systems. Generally accepted estimates of water demand indicate a doubling by 1980, and the most logical place to look for additional supplies of good-quality water is in these headwater regions. However, there is ever-increasing demand to use these lands for other products and services, and the manner of their management can make the difference between beneficial, well-regulated, sustained streamflow of good quality or erratic and silt-laden flow of destructive character.

Examples of Recent Accomplishments

Chemical characteristics of strip mine spoil banks complicate rehabilitation problems. A survey of spoil banks formed from strip mining on six principal coal seams in eastern Kentucky showed that the soil texture should support good plant growth, but chemically the soils are often highly acid. Also, the presence of large amounts of soluble salts may interfere with seed germination, plant growth, or uptake of water by plants. High concentrations of iron, manganese, sulphur, aluminum, and copper were found. While amounts of exchangeable potassium and manganese vary, most spoil banks contain only about one-tenth of the exchangeable calcium considered adequate to support

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normal plant growth. Twenty percent of the areas sampled indicated that major difficulties will be encountered in revegetating the disturbed area, but 60% of the areas indicated only minor problems. Further studies will be made to develop effective, rapid methods of identifying areas where chemical excesses or deficiencies will seriously impair revegetation efforts and to determine how these situations may be most efficiently remedied.

Reforestation with conifers concentrates spring snowmelt runoff. Planting abandoned agricultural lands in New York and other Northeastern States to pine results in a delay in snowmelt and, in some cases, higher peak flows of streams. Two watersheds on the Allegheny Plateau in central New York were compared, one a watershed with 80% open land and the other 84% forested--mainly with 25-30-year-old coniferous plantations. By March 24, half the total snowfall on the open watershed, but less than one-third of that on the reforested watershed, had melted. By March 28, beginning the first spring warm period, little snow remained in the open. Thereafter, the rate of potential runoff from snowmelt increased much more rapidly on the reforested watershed because of the greater amount of snow remaining. Thus, reforestation with conifers concentrates the spring runoff and may accentuate the flood hazard by retarding the beginning of rapid melt and holding significant amounts of snow on the watershed, to be melted rapidly under higher late-spring temperatures. Land managers should bear this in mind and where flood hazards must be considered should avoid large solid plantations of conifers, but rather should include blocks or strips of deciduous trees or leave unplanted blocks or strips.

Late-season streamflow increased by logging in dense Douglas-fir. A study in the Oregon Cascades determined that removal of dense, old-growth Douglas-fir from only a portion of a 250-acre experimental watershed, as could be done in a system of planned timber harvest, increased late summer streamflow 12 to 22%. On the western slopes of the Oregon Cascades, with characteristically wet winters and dry summers, maximum streamflow rates occur during the winter when the soils are saturated, and minimum flows occur during late August to mid-November. Stable increases in late-season flow, such as obtained on the experimental area, could significantly augment irrigation supplies during the season of greatest needs and improve stream habitat for important fisheries in coastal streams.

High-lead logging for unstable slopes. A study in central Idaho showed that considerably less erosion from steep, unstable slopes of granitic soils followed logging by the high-lead method than when jammer logging was used. During the first year following logging, erosion from the jammer-logged area was 1,136 tons of soil per square mile, and that from the high-lead area was only 28 tons per square mile. The primary

reason for the difference was the presence of roads in the jammer-logged area and the absence of roads in the high-lead area. These results point to the desirability of using the high-lead system where steep, unstable slopes are encountered and accelerated erosion is to be avoided.

Frequency of landslides increased following logging in southeast Alaska. Studies in southeast Alaska show that the number of landslides has increased greatly following logging. Study of aerial photographs of Maybeso Creek valley, about 40 miles west of Ketchikan, taken before logging show that 13 slides, about 32 acres, took place in the Maybeso Creek watershed during about 100 years before logging. Subsequent photos show that 116 slides and debris flows, affecting about 119 acres, have occurred in this area since logging began. Most of these occurred 4 to 5 years after logging. Rainfall is one of the important triggering forces, and it appears that logging and rainfall have combined to accelerate landslide occurrence. Nearly 70 slides occurred on steep, logged slopes during heavy rains in October 1961. Slopes of 70% or more are most susceptible to earth movement. The time lag in slide activity suggests that destruction of interlaced root systems by skidtrails, as well as death and gradual deterioration of root systems after trees are cut, may contribute to this mass movement of soil and debris. This study shows the serious proportions of the problem and points up the urgent need for immediate research attention to determine how to prevent accelerated landsliding due to logging. (See Figure O-3.)

Water repellent characteristics discovered in southern California soils. Studies on the San Dimas Experimental Forest, in southern California, have shown that about 60% of the soils are resistant to the infiltration of water (hydrophobic). One soil repelled water droplets as long as 92 minutes and even the medium sand fraction, when sieved out, resisted wetting for 10 minutes. The nature of this hydrophobic characteristic is not yet known, but it is found under both burned and unburned chaparral of dense cover. This discovery has great implications in terms of runoff and erosion, the establishment of herbaceous vegetation, and water yield in terms of the regulatory effects on water movement within the soil profile. Additional research will be directed toward learning more about this water repellent characteristic and how it can be counteracted to permit faster infiltration of water into resistant soils, thereby reducing storm runoff and erosion.

Watershed protection requirements developed for rangelands. Range sites on the Wasatch Plateau in central Utah which are capable of retaining rainfall in excess of 2.58 inches per hour will seldom produce surface runoff or erosion. Rainfall records show that this

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is the maximum rate of rainfall normally to be expected in this area. Research indicates that retention of this amount of rainfall will be attained on sites where the following conditions exist:

- (1) Bulk density of the surface 4 inches of soil less than 0.97 gram per cubic centimeter.**
- (2) Total protective cover (plants, litter, and stones) at least 85% of surface area,**
- (3) Large pore space of the surface 4 inches of soil at least 22% by volume.**

A deficiency in one condition can be compensated by a more favorable level in another condition. Thus, where soil bulk density is higher than 0.97, a higher than 22% noncapillary porosity of the surface four inches of soil or a greater than 85% protective ground cover would still give the needed protection against runoff and erosion. To enhance moisture retention in the soil and thereby reduce runoff, bulk density and pore space might be improved through easing the grazing intensity or changing the season of use. Ground cover might be increased through a change in grazing management or reseeding.



Landslides on steep slopes of Southeast Alaska following logging.

(17) Range Management Research \$1,190,000

A decrease of \$50,000 is made possible by discontinuing an aerial range pelletized-seeding research project in the Southwest. Research to date has not shown that aerial seeding of rangelands using pelletized seed is as cheap or effective as other ground seeding methods. This research is of less immediate importance than other high priority range improvement research yet to be done.

Range management research aims to find the best and most practical means to manage, improve, and maintain the productivity of forests and related lands used for grazing domestic livestock. It encompasses a variety of activities including: (a) determination of management systems and grazing intensities for the many different range types and conditions and properly coordinated with other uses, (b) development of range improvement measures such as conversion of low-value vegetation to desirable forage plants through prescribed burning, (c) determination of characteristics, responses, and requirements of range vegetation and classification of range condition and trend through studies of plant ecology, physiology, and taxonomy, and (d) determination of the identity and ecological relations of rodents, insects, and diseases to range vegetation as a basis for indirect and inexpensive control.

Grazing is the largest single use of land in the United States and as such constitutes a substantial portion of our agricultural economy. About half the total land area of the contiguous 48 States, some 940 million acres, is grazed by domestic livestock, and all of it is important for its wildlife values. These lands furnish forage for about one-half of the beef cattle and three-fourths of the sheep for at least six months of the year. A total of 560 million acres is forested or forest-related rangeland. Some 240 million acres of this is in Federal ownership and blankets the headwaters of the major rivers.

Vast areas, particularly in the Western mountains, have been damaged by past land use practices to the point where grazing is seriously affecting the quantity and quality of water produced. Moreover, present range forage production is on the average only half or less of potential, and falls far short of meeting the demands for livestock and game grazing. Demands on the forest ranges for all uses are sharply increasing. As a result, difficult problems continuously arise in the conservation and coordination of use of these lands. In the West, these lands pose many problems because of the variables and often droughty climate, highly erodible soils, and vegetation that will not withstand close grazing use. In the South, integration of grazing with timber production poses serious problems, particularly to small woodland owners. Furthermore, use by wildlife on all lands has to be carefully correlated with livestock grazing. Superimposed on top of this, particularly in the West, is the fact that nearly every forest range acre is of importance as watershed, either as a producer of water or as a potential producer of debilitating sediment.

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Methods of management must be found to allow the forage to continuously renew itself in keeping with other uses. Also sorely needed are surefooted but less costly methods of range-watershed rehabilitation and sharper criteria and methods for use by the range administrator and rancher in judging trends in range improvement or deterioration. Range research must be planned and carried out so that its results can be coordinated with and add to the findings of other Forest Service research on wildlife, timber production, watershed management, and recreation. The results are needed to harmonize multiple use management.

Examples of Recent Accomplishments

Range productivity is restored by conversion of pinyon-juniper to grass. There are 74,000,000 acres of pinyon-juniper range in Western United States. Much of this area was at one time open grassland or savannah upon which these low-value trees have encroached. Studies have shown that forage production is inversely related to density of the overstory. Essentially no forage is produced under dense tree stands. By removing the trees, 700 to 800 pounds of forage per acre can be obtained. (See Figure 0-4.) Using principles and techniques developed by research, about 2,000,000 acres of pinyon-juniper ranges have been treated by ranchers and Government agencies in Arizona and New Mexico alone.

Combined use of native and seeded range increases profits. Grazing native range in combination with fields that have been improved by seeding to introduced forage grasses holds promise for greater profits to small ranchers who have limited land resources in the eastern front of the Rocky Mountains. Here, increased animal production is important to the rural economy, which is largely dependent on livestock production. Land seeded to crested wheatgrass, Russian wildrye, and big bluegrass has yielded 30 to 100 pounds more beef per acre than adjacent native range, and a well-planned system utilizing both native and seeded range gives higher profits and makes more efficient use of available forage resources. For example, at weaning time last year, calves raised under a plan of integrated use were heavier and were worth \$4.10 more per head than those that grazed only native range.

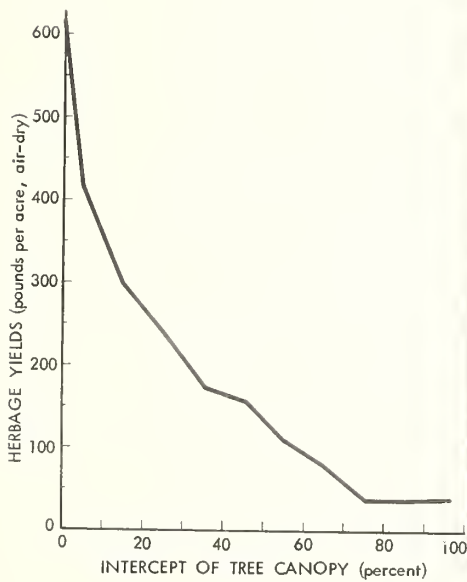
Cattle makes maximum daily gains of 2 pounds per head on cheatgrass range. Studies at the Saylor Creek Experimental Range in southern Idaho show that cattle make satisfactory gains on cheatgrass range, even after the grass has matured. During 3 years, 1961 through 1963, daily gains of weaned calves averaged 1.5 pounds per head during the 7-month grazing season from April until November; gains varied from 1.2 to 1.7 pounds per head. Daily gains reached a maximum of about 2 pounds per head during the green feed period in May and June, then declined to less than 1 pound per day in the fall. (See Figure 0-5.) Quantity and quality of forage associated with weather and other

conditions are reflected in the variable seasonal gains. Future research will seek to determine at what grazing intensity cattle gains decline significantly, and effects that various systems of grazing will have on cattle production and vegetation.

Heavy grazing of crested wheatgrass reduces cattle gains. Effects of three intensities of cattle grazing on crested wheatgrass have been studied cooperatively by the U.S. Forest Service and Utah State University on a range area at Bemmure, Utah, over the 11-year period, 1948-1958. The heaviest stocking rate (80% utilization) initially produced the highest gains per acre, but animal production declined sharply until 1954, then leveled off. During the last 5 years of the study, 1954 through 1958, highest gains were obtained under an intermediate stocking (65% utilization); and heavy stocking gave lowest production. Heavy grazing also reduced grass yields and accelerated invasion by big sagebrush, an undesirable plant that competes with grass for the limited moisture supply. For optimum productivity, crested wheatgrass should not be utilized more than 60-65% during the spring growing season.

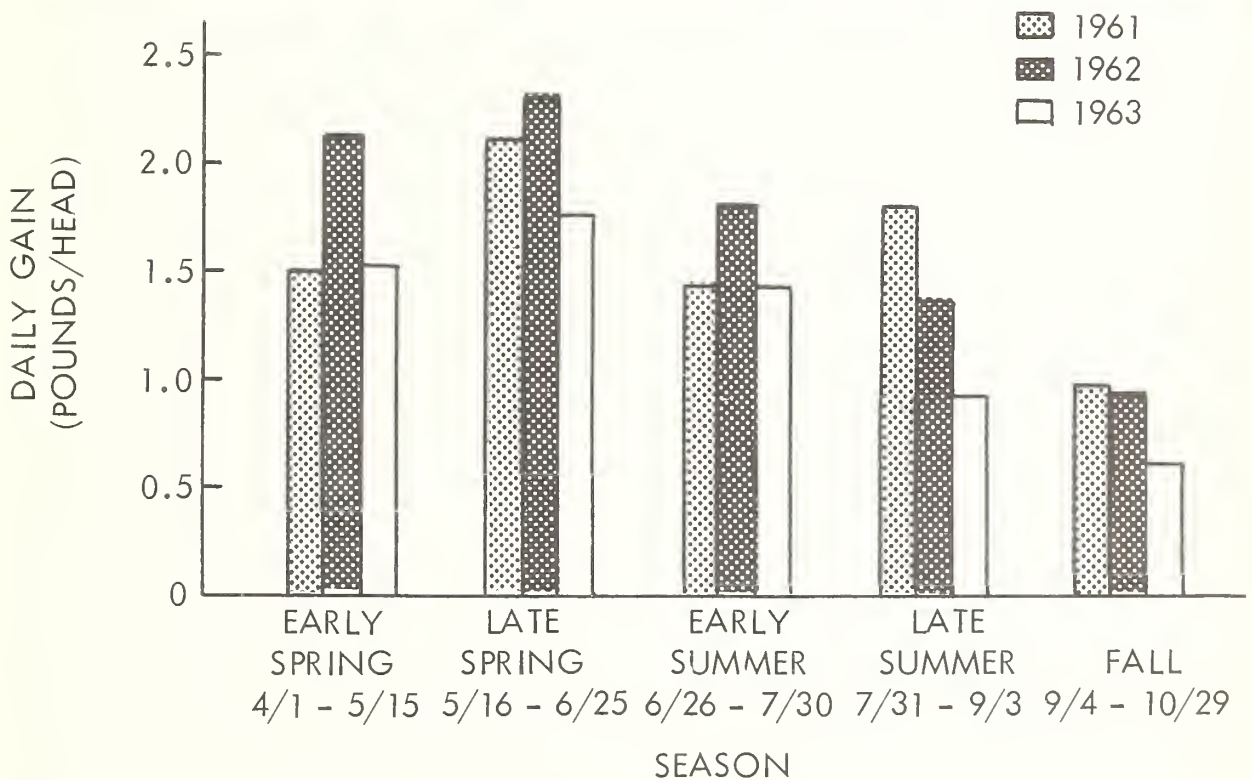
Use of fire aids management of southern forest ranges. On longleaf pinebluestem range in Louisiana, a 3-year burning rotation increased forage value, improved grazing distribution, and reduced undesirable vegetation. When one-third of a range was burned each year, cattle were attracted to the newly burned areas, utilizing 78% of the forage and keeping regrowth palatable and nutritious. Consequently, cattle gained weight throughout summer and fall while herds on unburned, and even moderately grazed range, normally lose weight. Intense grazing following fire lowered herbage production temporarily, but intervening 2-year periods of relatively light utilization (18-31%) restored plant vigor. As burned areas were rotated, each part of the range in turn was grazed intensively, with optimum distribution of use over the 3-year period. Fire lowered infestations of cutover muhly--a weedy grass--by more than 90% and top-killed most scrub hardwoods. Burning also reduced litter accumulations which in this plant community retard grass growth.

Pine reproduction develops well on grazed areas. Research on long-leaf pinebluestem range in central Louisiana has demonstrated the compatibility of beef production with pine regeneration. Where good herd management was applied, browsing damage to planted pines was negligible under yearlong moderate grazing (50% forage utilization). Even on a more heavily grazed range (65% utilization), the proportion of seedlings damaged was low: 12% were browsed lightly, 4% moderately, and 1% severely. On direct seeded range, grazing reduced the number of pine seedlings at the end of the first growing season, but stocking was more than adequate even under heavy grazing.



Grass production on pinion-juniper ranges is inversely related to density of the trees.

Figure O-4



Daily gains of cattle on cheatgrass range reach a maximum of about 2 pounds per head in late spring, then decline through the rest of a 7-month grazing period. Yearly differences in gain appear to result from variation in amount of particular species available and in quality of feed.

Figure O-5

(18) Wildlife Habitat Research \$691,000No program increase is proposed for fiscal year 1966.

Wildlife habitat research is concerned with the development of management and improvement practices to support optimum populations of game and fish in harmony with production of timber, water, and livestock on forest and related rangelands. Each kind of animal has specific habitat requirements that must be balanced against requirements for production of water, timber, and forage for livestock. As a basis for successful integration of wildlife, livestock, and timber production, the nature and degree of competition between wildlife and livestock are determined for various types of forest and rangelands, as well as effects of silvicultural and timber harvesting practices on food and cover plants and reciprocal effects of forage production and wildlife grazing on timber reproduction and growth. Research studies the effect of forage utilization and environmental factors on seedling establishment and survival. Special practices are developed for increasing food and cover for both big and small game by seeding, planting, burning, spraying, and fertilizing. Research on fish habitat improvement includes studies of regulating shade and water temperatures through manipulation of streamside vegetation, creation of gravel spawning beds, and stabilization of channels. The wildlife habitat research program involves active cooperation with Federal (particularly the Fish and Wildlife Service) and State fish and game agencies and educational institutions.

Although habitat conditions on some areas are suitable for supporting high wildlife and fish populations, the capacity of most forest and related rangelands can be greatly increased. Some of the low-producing areas are the result of damage from logging, fire, or overuse by livestock or big game, whereas others are due to the natural development of vegetation that is unproductive for wildlife. In some areas, deterioration of the vegetation cover and accelerated soil erosion have resulted in unfavorable water temperatures, excessive stream siltation, unstable channels, and exposed banks. Consequently, many streams flowing through these lands are below their potential for fish production. In some western mountain streams, dense shade from riparian vegetation maintains water temperatures too cold for trout.

In the West, emphasis is placed on studies concerned with rehabilitation of big-game winter ranges; integration of wildlife and timber production, competition and resolution of conflicts between big game and livestock, and habitat management to improve game distribution and allow efficient utilization of available forage and cover, and manipulating livestock range improvement practices such as sagebrush and juniper control to provide for food and cover plant needs of big and small game. In the South and Southeast, studies include the integration of deer and small game with timber and livestock production. In the Northeast and the

Project (18)

Lake States major emphasis is on studies to improve habitat and reduce wildlife damage to northern hardwood species through modification of silvicultural practices. In the Central States studies are concerned mainly with small upland game habitat management and revegetation of forest openings with suitable food and cover plants. In the Appalachian States research will include management and habitat improvement for turkey, grouse, and deer. In the Northern Lake States, research will be undertaken on upland game habitat in the northern hardwoods and related swamp types. In the Missouri Ozarks, research will be focused on wildlife habitat evaluation, improvement and management of upland game and integration of wildlife and timber production. On National Forests and other public lands research emphasizes how best to improve habitat and at the same time to integrate wildlife use with use of the land for timber and livestock production.

Examples of Recent Accomplishments

Deer browse production increased by timber harvest. By proper manipulation of residual stand density, northern hardwood pole stands can be made to produce desirable levels of both game browse and timber. In a cooperative study between the Northeastern Forest Experiment Station and the Pennsylvania Game Commission, cutting 50-year-old hardwood stands to residual basal areas of 0, 15, 30, 45, and 60 square feet per acre resulted in an average annual production of 45, 36, 34, 22, and 17 pounds (green weight) of browse per acre, respectively, during the first 3 years after cutting. The treatment which left 60 square feet probably approaches the optimum level of thinning required to produce quality timber. However, in some areas it may be prudent to compromise management treatments between optimum timber production and optimum browse production in order to better meet the demands for both. (See Figure O-6.)

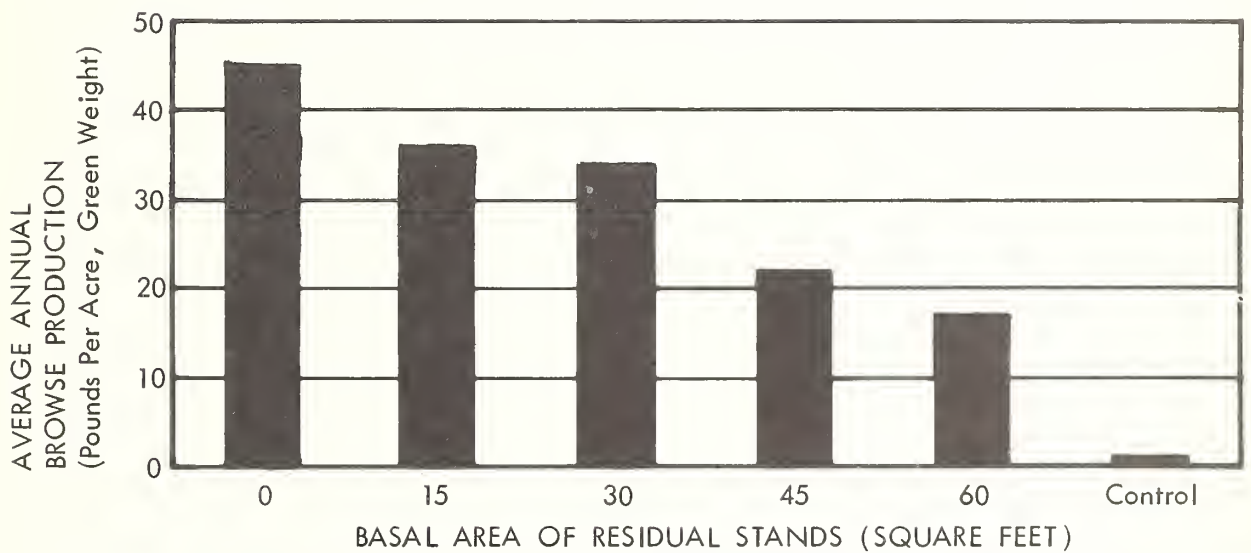
Forest openings are important elk habitat. Recent studies have shown that natural openings in the forest are an important part of elk habitat in the Southwest. In contrast, openings are less important to deer. In a ponderosa pine forest in Arizona, where natural openings comprised 13% of the forest area, elk used the openings 1.8 times more heavily than adjacent forest. Elk made best use of openings up to 45 acres and made relatively less use of larger areas. On the other hand, deer made about equal use of small openings and the surrounding forest. Harvesting timber by clear cutting in small blocks, then, should improve elk habitat without being detrimental to deer.



BASAL AREA - 15 SQUARE FEET



BASAL AREA - 60 SQUARE FEET



By proper thinnings, northern hardwood pole stands in Pennsylvania can be made to produce desirable levels of both deer browse and timber. This information was brought out in a recent study of five levels of thinning (plus a control) where measurements of browse production were recorded over a 3-year period for six commercial tree species.

Figure O-6

(19) Forest Recreation Research \$432,000

No program increase is proposed for fiscal year 1966.

Forest recreation, once considered a minor use of the forest, has become a major use and has created many problems that cannot be effectively solved without supporting studies that are soundly organized and carried out. In 1940, the National Forests received 16 million visits. Last year this number increased to 123 million. Millions more are visiting other public and privately owned forest recreation areas--and the upward trend will continue. This buildup must be fitted into increasing demands for water, timber products, wildlife, forage, and other forest resources. Also, as part of the Department of Agriculture's program to aid farmers, especially in economically depressed rural areas, forest recreation studies are aimed at identifying and evaluating opportunities for income-producing recreation by the small woodland owners.

Forest recreation research is underway at 8 of the 10 regional Forest Experiment Stations. Current studies are pointed toward: (a) the management of the recreation site--to determine how campgrounds, picnic areas, and other developed areas receiving heavy use may best be planned and managed to prevent damage to soils and vegetation and be maintained without costly rehabilitation of wornout sites; (b) to better understand the essential requirements for recreational habitat and developments of those who use the recreation areas; and (c) to identify and explore the economic opportunities for developing income-producing recreation enterprises on privately owned (often farmer owned) woodlands--with particular emphasis on economically depressed rural areas.

Examples of Recent Accomplishments

Cutting costs in measuring recreation use. Counting recreation visitors and measuring kind and amount of recreation use have, heretofore, been expensive but necessary for effective management planning. A relatively simple and much less expensive method relating highway traffic axle counts to numbers of visitors and their type and amount of recreation use was developed in the Southeast. The technique has proven to be efficient and reliable and has received widespread adoption in the Southeast and other sections of the country.

In California, at winter sports areas, records of ski tow lift tickets or restaurant receipts provided estimates within 8% of true attendance for the winter season. (See Figure O-7.)

Project (19)

Making woodland recreation pay. Adding a campground or picnic area to the farm woodland enterprise is no automatic key to improving farm income. Privately owned, fee-charge, farm woodland recreation enterprises are more apt to be successful, however, if they are near large metropolitan areas and services and outdoor facilities are provided. (See Figure O-7.) A study of private forest picnic enterprises in Ohio showed that visitors want more than just picnicking facilities. In fact, income from one-third of the private forest picnic enterprises was not enough to cover operating expenses, and an even larger number of enterprises was unable to compensate the owners for their labor, management, and interest on investment. However, fee incomes to pay costs and compensate the owner were substantially increased by: (1) increases in the amount spent on advertising; (2) the provision of swimming facilities; (3) by locating within 30 miles of a metropolitan area; (4) increases in the number of complimentary services provided such as playground equipment and leadership in outdoor activities; and (5) by locating in an area where personal incomes are high.

The opportunity for a woodland owner to make recreation pay is also governed by his aptitudes, interests, and skills. Ability to manage time, labor, capital, and people efficiently is as important in the recreation business as in any other.

Facts obtained on family camping. Studies to determine what family campers expect in terms of facilities and what they enjoy when camping have yielded two important findings. The research was done in Oregon and Michigan. First, the typical camping family has no objection to paying a campground fee where special facilities are provided such as water, tables, wood, and other conveniences. Second, the family is anxious to get information on forest resources, on programs of the agencies administering recreation, and on other facts that bring them closer to the out-of-doors and its enjoyment. These findings are helpful to administrators in planning recreation programs and establishing policy to guide recreation developments.

Conflicting uses of wilderness canoe country analyzed. Many types of visitors come to Minnesota's Boundary Waters Canoe Area--canoeists, boat campers, fringe campground campers, summer home users, resort guests, and one-day fishermen. Studies in the canoe area point toward ways for harmonizing and coordinating these different types of recreation use. Canoeists are the largest group and see the wilderness differently than other visitors. The more visitors an area had, the less it was considered a wilderness area by the canoeists, especially if there were motorboats in the area. Even light motorboat use destroyed the canoeists' wilderness environment. The area that met the canoeists' image of wilderness was much smaller than that of the other visitors.

Motorboating, fishing, and viewing the scenery equalled or exceeded wilderness as an appeal to most of the other visitors. Their "wilderness" concept was not lost even where recreational use was fairly heavy. Simple roads were accepted. A large area, much of it outside the designated boundaries of the canoe area, met these standards and was viewed as wilderness by other types of visitors. These images and elements of incompatibility help explain some of the distribution patterns. They also suggest policy and ways of zoning to increase the recreation capacity and the users' satisfaction with the area.

Campers fit no standard pattern, nor will one standard type campground fill their needs. Campgrounds cost a great deal to develop and maintain, and we must find ways to operate and maintain them efficiently and inexpensively. Studies to gain a better understanding of the camping groups and their preferences are helping to attain these objectives.

Some campers prefer to be surrounded by many of the conveniences of home and the sociability and security of other people, while others pack their equipment across miles of rugged country in search of solitude and the experience of roughing it in truly wild surroundings. (See Figure O-8.) Camping tastes of all shades are found between these extremes, and the needs of different campers cannot be fulfilled by one standard type of campground. Variation in campground design and layout will (1) protect areas from deterioration, (2) satisfy the needs of gregarious groups as well as those seeking privacy, and (3) make more efficient use of campground funds. Seven types of campgrounds--varying from highly developed central camps, peakload camps, to small back-country camps--were suggested and described in the study.

Variation in design and layout within the campground itself may be desirable. In a northeastern Pennsylvania study, about two-thirds of the campers wanted to be within 50 to 100 feet of other campers. Most of the remaining one-third preferred to camp 250 to 400 feet from other campers. A small proportion, however, wanted campsites 10 to 15 feet apart. Related studies in Oregon and California showed that one-fourth of the filled single-family campsite units were occupied by two or more families, even though there were empty and available single-family units in the same campground.

Further information on the importance of campground design and its effect upon the popularity of some campsites and nonuse of others, as well as an indication of regional differences in taste, were highlighted in a Rocky Mountain study. Campsites within 50 feet of the parking area were used more often than those over 50 feet. Sites more than 100 feet apart were used more often than those closer together. In fishing areas, sites more than 50 feet but less than 200 feet from a fishing point were preferred. By their selection of campsites, it was found that visitors preferred to camp more than 50 feet but less than 200 feet from toilets. They preferred to be not more than 150 feet from a source of drinking water.

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Campgrounds along or near highways on California National Forests received a markedly different kind of use than campgrounds off the beaten track. Visitors were more often without children, traveled in smaller groups and typically stayed only overnight. Less accessible campgrounds were occupied mostly by 4-person families who stayed for either a weekend or an entire week.

Ready access for visiting hunters is important in the management of hunting areas in the Southeast. Hunters, like campers, fit more than one pattern, and better understanding of their differences can mean better hunting and better management of the recreation and wildlife resource. An analysis of records obtained by the North Carolina Wildlife Resources Commission was made of the location of 4,100 deer kills during four hunting seasons on 14 wildlife management areas. Most deer were harvested close to roads and trails. However, important and surprising differences were found between the piedmont and western mountain region in the use of roads and trails.

In the steep, rugged mountain areas, largely populated with rural residents, hunters made exceptionally good use of all portions of the forest, and their kills were uniformly distributed. Hunters in the gently rolling piedmont, on the other hand, coming from nearby cities, apparently stayed close to access and did not penetrate the more remote sections. In all areas, trails were used as heavily as roads, indicating that for hunting areas where additional access is desired, trails which are less expensive and usually more aesthetic may be preferred.

Ground cover reaction to heavy camper use. No campground vegetation can indefinitely withstand heavy trampling pressure and still flourish. Research can, nonetheless, seek efficient ways to restore or develop and maintain a pleasant campground setting.

We are studying the reaction of ground cover to different intensities of use in a new campground in Pennsylvania. As might be expected, the close of the first use season revealed a marked reduction in the abundance of vegetative cover, as well as a general decline in the number of plant species present. The rate of decline, however, was not proportioned to the rate of use. Campsites that averaged one camper per day over the season averaged only a 10% loss of cover. When use averaged more than two campers per day, loss in vegetative cover soared to 60%. Up to 100 camper days of use, the loss was negligible, beyond 100 days the loss was rapid. A wide variation in the tolerance of ground cover species was found. Several species passed out of the picture. Two grass and grasslike plants, however, may have the resistant, compaction-tolerant attributes we are seeking. Canada bluegrass and pathrush not only withstood the onslaught; they may invade areas occupied by less tolerant species.



Records of ski tow receipts provide an accurate and inexpensive method for measuring total attendance, duration, and type of winter sport activity.



Privately owned, fee-charge farm woodland recreation enterprises are more apt to be successful when located near a metropolitan center and several services are provided.

Figure O-7



Some campers want the sociability and security of other campers. Campers fit no standard pattern, nor will their needs be fulfilled by one standard-type campground.



Other campers seek solitude and the experience of roughing it.

Figure O-8

(20) Forest Fire Research \$2,247,000

An increase of \$350,000 would be used to more fully utilize the facilities of the forest fire laboratories at Riverside, California, Missoula, Montana, and Macon, Georgia which were constructed for the specific purpose of supplying new knowledge fundamental to development of prevention and control techniques that will improve protection of the forests from fire. These laboratories have unique equipment and the preliminary work accomplished with it shows high promise. If now pursued more aggressively, the result will be important new techniques for more efficient forest fire prevention and control. The results of basic laboratory research would be used at field stations in the West to analyze the fire control impact of the changes in forest fuels that result from converting overmature timber to second growth, so that new methods and criteria for planning prevention and control systems can be devised that will meet local needs; in the East to determine the amount and form of fire prevention and control measures required for systematic protection of the forests, to develop new applications of research results to provide that protection and to improve methods of appraising fire damage to hardwoods.

Forest fire research is aimed at the development of new technology needed by State, private, and Federal forest protection agencies throughout the United States. These agencies annually combat some 100,000 forest fires. The annual forest fire control costs are more than \$140,000,000. The fire damages amount to a much larger sum. To meet present day requirements for the protection of forest resources and for the safeguarding of human lives and property endangered by fires, better methods are urgently needed for fire prevention and control.

Study of forest fire problems throughout the Nation has shown specific research needs and the opportunities to develop new technology. The research already accomplished has led to significant advances in resource protection. The first phase of a new fire danger rating system is assisting forestry agencies throughout the country in fire control planning and management. Fire fighting chemicals are being applied from tank trucks and aircraft. New hazard reduction techniques are reducing the danger of fires in cutover forests, plantations, and recreation areas. Helicopters and fixed wing aircraft are being used more effectively in fire control operations.

An accelerated and strengthened research program now has a unique opportunity to provide more effective solutions to these critical fire problems. The planned research for fiscal year 1966 includes the following:

Project (20)

- (a) Electronic fire detection. Development of a system in which patrol aircraft equipped with heat sensing infrared scanners will detect fires either night or day and transmit the precise location of fires to dispatching centers. This system could speed up fire detection and reduce the chances for dangerous fires to have time to develop into costly conflagrations.
- (b) Lightning fires. Development of radar and electronic system techniques for tracking lightning storms and measuring their fire-setting potential.
- (c) Fire behavior. With the aid of wind tunnels and combustion chambers now available in the forest fire laboratories development will proceed of methods to determine fire ignition and spread according to variations in wind, humidity, temperature and forest fuel conditions. The resulting fire behavior knowledge from this type of research can provide fire control agencies with basic guides for improved planning and management.
- (d) Firefighting methods. Development of new techniques for use of firefighting chemicals and of air and ground fire attack systems to meet specific forest conditions in the various regions of the United States.
- (e) Hazard reduction. Development of techniques for reducing the fire hazards in various forest types including the controlled use of fire to remove unneeded vegetation, mechanical chipping of residue material and the reduction of dangerous fuel complexes with fire breaks or replacement with less hazardous plants. The prevention and control of conflagrations in many parts of the country require solution of problems of eliminating massive bodies of fuels which are a threat to valuable forest resources and to human life and property.

Examples of Recent Accomplishments

Method developed for testing effectiveness of fire prevention signs. Large numbers of several types of signs are used to convey fire prevention messages to the traveling public. A technique has been developed and adapted which permits quantitative measurement of the effectiveness with which a particular sign invokes a desired response in the viewer. The system will be pilot tested this year on selected problem areas to determine which existing fire prevention signs are paying their way.

Lightning strikes have differing potential for fire starts. Research carried out from our fire laboratory at Missoula, Montana, has resulted in new equipment that permits a detailed analysis of individual lightning strikes. Past work has shown that each lightning strike is composed of several discharges following the same path between cloud and ground in quick succession. A high speed record of the electrical potential in these separate discharges can be slowed down as in slow motion photography to spread out the time scale and thus show the detailed nature of the phenomenon. Study of a small number of these records collected to date

indicates a wide variation in the details of these lightning strikes and the probability that only certain types may have fire-starting capabilities. Thus, cloud seeding may prove effective against lightning fires by altering the characteristics of lightning discharges.

Electronic tracking of lightning storms saves fire detection time. A prototype electronic system has been developed for quickly locating remote forest areas hit by lightning strikes. Preliminary research results show that two electronic stations may locate lightning zones by triangulation and record the number of strikes. These potential fire zones then become quick targets for patrol aircraft which would otherwise waste search time before detecting fires.

Infrared scanner passes preliminary fire detection tests. The airborne infrared scanning system reported last year as having potential possibility for the detection of small fires has been further modified and tested. Recent field tests showed a very high probability of detection for fires of 3- to 6-foot radius beneath pine and fir stands at vertical angles of 0° to 50°. Beneath typically more dense Engelmann spruce, there was an acceptable detection probability when the fire radius reached 12 feet. Fires of these sizes are well within acceptable limits for successful initial attack. Detection over an 8-mile wide strip can be achieved by scanning from a height of about 16,000 feet above the landscape. (See Figure P-1.)

Weather dictates fire danger. Fire control coordination and action at the national level in time of civil or military emergency has been made practical by a recent study in cooperation with the Weather Bureau and the Office of Civil Defense, Department of Defense. Ten-year records of weather and large fire occurrence in each of 14 regions in the 48 States were analyzed to determine the synoptic weather types that produced high fire danger in any region on any day. Analysis of current weather maps issued by the National Weather Center for these areas quickly indicates where the fire potential is high.

Prescribed fire in the South reduces size but not numbers of fires that start. Study of how and when to use prescribed fire for hazard reduction in southern pine types has identified the best conditions of fuel moisture and relative humidity. Satisfactory fuel moistures range from 5 to 14% (optimum about 8) and relative humidities from 30 to 60% (optimum about 40). A companion study to determine the real effectiveness of prescribed burning showed it to have little effect on the numbers of fires that start. The difference in areas they burn, however, is tremendous. Burned area is negligible the first year and slowly increases up to 5 years after using prescribed fire. All wild fires requiring control measures in the study area originated and burned primarily in areas untreated for 5 or more years. The research will assist in scheduling prescribed burning.

Seminars help disseminate research results. No phase of forest fire control has changed so rapidly or drastically in recent years as the use of fire retardant chemicals, which were introduced as a result of previous research. To help relieve this situation, two-day seminars were organized at each of the three Forest Service fire laboratories this spring to: (1) acquaint fire control personnel and administrators with the latest developments and techniques in the use of retardants for both air and ground attack and (2) furnish attendees with aids and supporting materials for relaying the information on to others in their organizations. Ninety Federal, State, and local protection officers participated in these regional meetings. (See Figure P-2.)

Studying mass fire. Our Riverside, California, Forest Fire Laboratory in cooperation with the Department of Defense, Office of Civil Defense, has developed instruments and techniques for measuring some of the unknown characteristics of mass fires. Working with heavily instrumented full scale test fires as large as 218,000 square feet, the staff has carefully documented temperatures, pressures, gas composition and heat and air flow in and around the burning zone. Among new findings from completed tests are: Flame temperatures exceeded 2500°F. This is 500 to 1000°F. higher than in laboratory or small scale field fires. Positive pressures occur in the burning zone and negative pressures outside.

Ambient wind flows around a large fire as around a solid object, forming eddies on the lee side. Indraft to the fire may be slight near the ground, increasing with height. Convection above a mass fire has both strong updrafts and downdrafts into the burning zone. High concentrations of carbon monoxide with deficiency of oxygen occur in the flaming area. Information in this area is essential for improved forest firefighting and for Civil Defense activities.



An infrared scanner in a high flying aircraft employs an electronic heat sensing technique to detect small fires in forest areas.

In this scanner imagery from a midnight flight, 8 buckets of glowing charcoal beneath the forest canopy can be clearly identified near the center of the illustration. Small fires can also be detected through dense smoke. These research results may provide the technical basis for a new, highly efficient fire detection system which can rapidly detect fires day or night.

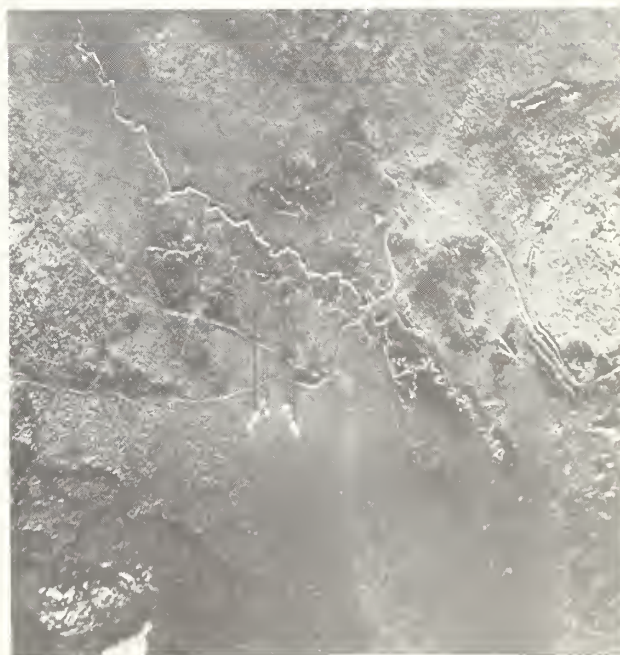
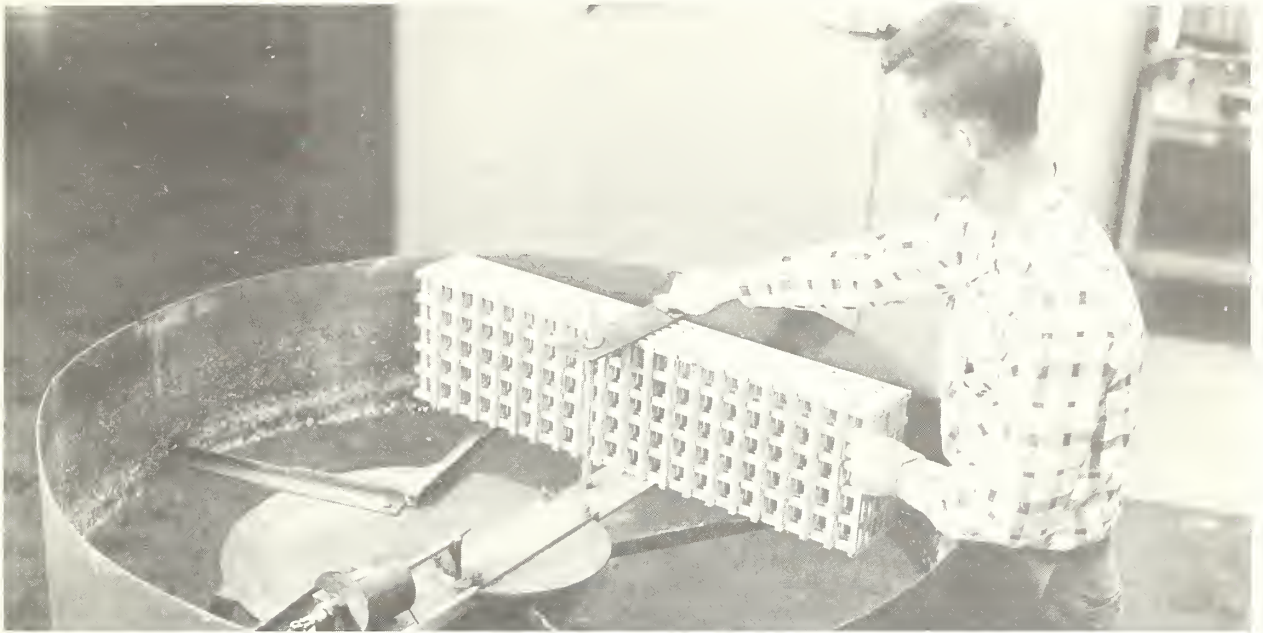


Figure P-1

Part of the search for new fire fighting chemicals involves testing their fire retarding effectiveness. The first step is carried out in the laboratory where, under carefully controlled conditions comparisons can be made much more economically than in field testing.



A standard wood crib is dipped in the chemical bath, then spun in this device to leave the crib with a uniformly thin surface coating.



After being dried to a predetermined moisture content, the crib is burned under controlled conditions of wind and humidity. The rate that fire spreads through the crib is the principle criterion of treatment effectiveness.

Figure P-2

(21) Forest Insect Research \$3,735,000

No program increase is proposed for fiscal year 1966.

Research on forest insects is directed toward the prevention and control of destructive insect attack on forests and forest products. Damage by insects enters into all phases of forest management from the seed to the mature forest. The development of effective and economical methods of direct and indirect control is dependent upon thorough knowledge of life histories and habits of forest insects, including the interrelationships between the insects and their environments. Control of forest insects by indirect methods such as the use of native or introduced parasites, predators, and diseases of insects; by silvicultural practices designed to prevent the buildup of insect epidemics; and by radiation and chemosterilization techniques, offers promise and is being given major emphasis in the research program. Investigations on direct control methods involve mechanical and chemical methods, including development of safer chemical insecticides and systemics.

Included among the many insects under investigation are: (1) those that kill trees outright, such as the bark beetles which cause heavy losses in the West and South; (2) a wide variety of species that feed on the foliage of trees and either kill them outright or reduce their vigor and growth, such as the spruce budworm and gypsy moth; (3) species that damage or destroy the flowers, seeds, and cones of trees; (4) borers that tunnel into the wood and reduce its value through degrade; (5) borers such as termites that damage or destroy valuable forest products, such as logs, lumber, and pulpwood; and (6) various species that damage or destroy young trees in forest plantations, such as the European pine shoot moth. No part of the country is immune to the ravages of these insects, and no year passes without one or more of them occurring in the form of outbreaks.

During an average year insects kill enough commercial sawtimber to build some 600,000 average-size homes; during periods of outbreak, which occur at frequent but unpredictable intervals, these losses are much more severe, often bordering on the catastrophic. In addition, insects kill a billion cubic feet of timber below sawtimber size and cause a growth loss of three-quarters of a billion cubic feet each year. Forest insect outbreaks also result in increased fire danger and often set the stage for destructive fires which impair valuable watersheds and wildlife habitats. They jeopardize the success of seed orchards and tree-planting programs;

Project (21)

they destroy enormous volumes of forest products, such as logs, lumber, and pulpwood; and they reduce the carrying capacities of forest-related ranges for livestock and big game. Insect-caused losses such as these show no signs of decreasing. Instead they seem to be increasing in severity year-by-year. Public demands for relief from them are becoming increasingly insistent.

The program for fiscal year 1966 will deal with research on the causes of outbreaks of some of the most destructive forest insect pests as a basis for developing safer, cheaper, and longer-lasting methods of preventive control. In this program, special emphasis will be placed on studies of biological control factors such as insect parasites, predators, and disease pathogens. Emphasis will likewise be placed on: (a) studies of other environmental factors affecting insect populations, such as stand age, condition, and density; (b) on determining factors of tree resistance to insects as a basis for developing resistant strains or hybrids for use in planting programs; and (c) on exploring possibilities of control through the use of chemosterilants, irradiation, and attractants and repellents, and for the development through genetic manipulation of more effective strains of insect parasites and predators. Studies in chemical control will be continued with emphasis on determining modes of action of chemicals on and in both insect pests and their host trees, as a basis for developing (a) safer and more selective materials and formulations and (b) safer and more effective means of application.

Examples of Recent Accomplishments

Radiography aids in sampling insect populations under the bark or in the wood of trees. In the past, the method of sampling populations of bark beetles under the bark, or of borers in the wood of trees, was usually by dissection. This was necessarily a slow and fairly costly task. Recent studies have shown that these insects can be sampled satisfactorily and at much less cost by x-ray radiography. In California, it cost less than one-fourth as much to count western pine beetles in pine bark by radiography than by dissection. It also cost less than one-third as much to locate and count wood wasps in wood blocks by radiography. In the South, southern pine beetles in bark samples were counted 18 times faster by radiography than by dissection. This new sampling technique offers much promise in reducing costs of surveying and evaluating bark beetle and wood borer infestations. These surveys are essential in determining levels of population reaching outbreak stage and therefore requiring control measures.

A method of mass rearing of the southern pine beetle perfected.

During past years, research on the biology and control of the southern pine beetle, one of the most destructive forest pests in this country, has been seriously hampered by the inability to maintain a continuous supply of an adequate number of beetles for study purposes. This has occurred because of the lack of a method of rearing the species. During the past year this obstacle was finally overcome through research and it is now possible to rear adequate number of beetles on a continuous year-round basis under controlled conditions. This should greatly facilitate needed research on such basic problems as the fertility and fecundity of the beetle, the genetical effects of crossbreeding and inbreeding, its nutritional requirements and its parasitic and predaceous enemies useful for control purposes.

Powerful sex attractant produced by female carpenterworm moths.

It has been learned that virgin female carpenterworm moths secrete an extremely potent odor that attracts male moths for mating. For example, a single female moth placed in a cage in a wooded area in Mississippi attracted 316 males into the trap in 5 days. Several marked males were attracted and trapped after release as far away as one-half mile. This finding may lead to the synthesis of the attractant material and to the development of a cheap, safe, and effective method of reducing or preventing damage by carpenterworms to valuable living hardwoods in the Deep South.

A native predator aids in control of the round-headed pine beetle.

Studies in a 4-year old outbreak of the round-headed beetle in ponderosa pine in southern New Mexico indicate that a predaceous beetle, Enocleris sp., played an important role in suppressing the outbreak. Much of the reduction in the bark beetle population occurred during May and June at a time when the predator population averaged 15 per square foot of bark surface. Further study is needed to determine conditions most favorable for development of populations of this enemy of the bark beetle and how to take advantage of this information in efforts to reduce the frequency and severity of destructive beetle outbreaks.

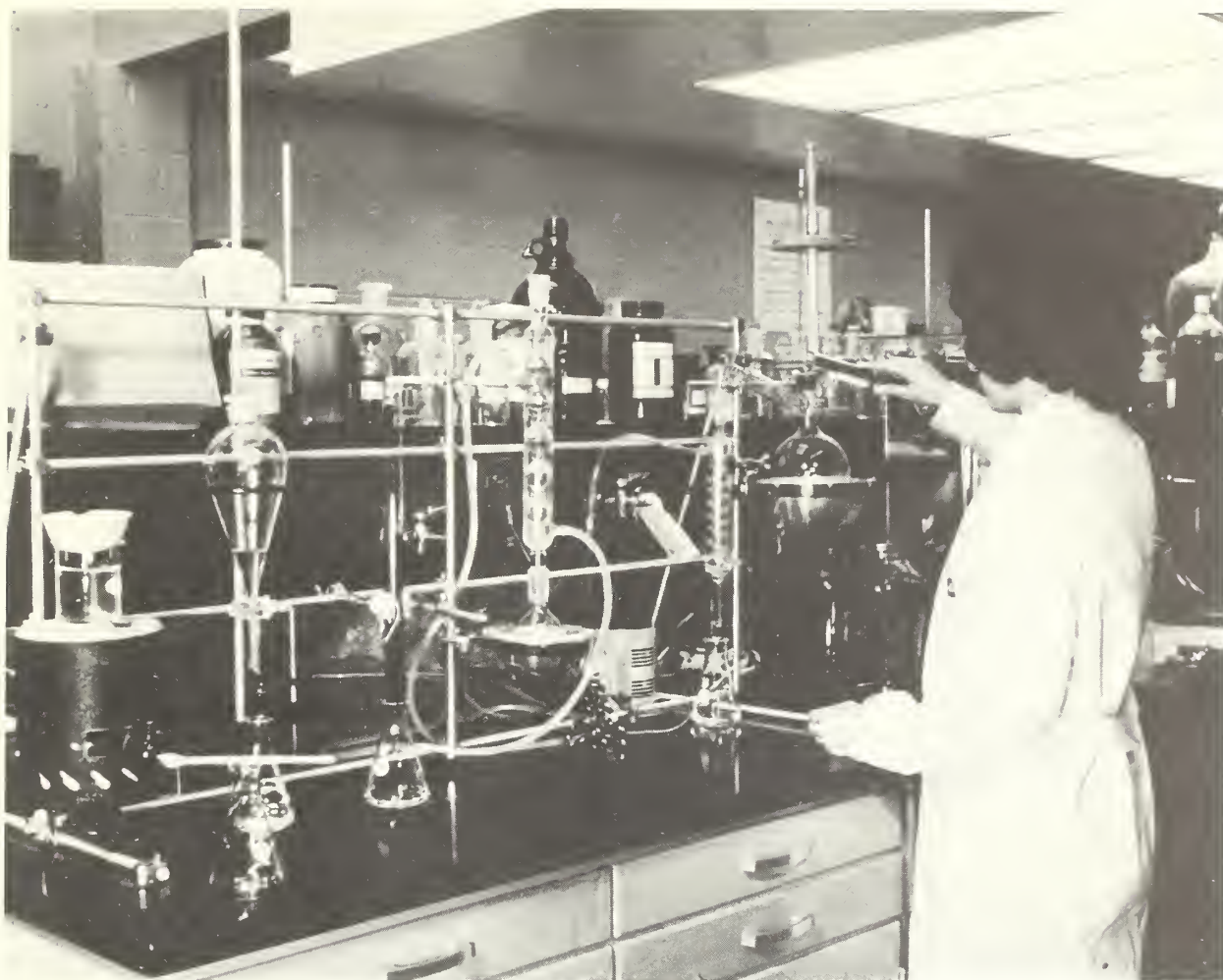
A virus spray has potential for control of gypsy moth populations.

Promising results were obtained in recent studies in Connecticut to determine possibilities of controlling a gypsy moth infestation with a virus spray. Using a truck mounted mistblower, a spray containing 1 trillion virus polyhedra per gallon was applied to a 1-acre plot in a moderately to heavily infested stand at the rate of 4 gallons per acre. Examinations made a few weeks later in the sprayed area and in adjoining unsprayed areas revealed a sharp reduction in gypsy moth abundance in the treated areas. Further research is needed to determine the possibility and practicability of using this promising spray to control this destructive insect.

Lindane can be used during the winter to control bark beetles. Recent studies in California have shown that the chemical lindane dissolved in diesel oil can be used to control bark beetles just as effectively during the winter as during warmer seasons of the year. On the basis of this finding, it should no longer be necessary to use the more expensive bark penetrating sprays, such as ethylene dibromide, in bark beetle control projects conducted during the winter.

Characteristics of spruce-fir stands influence spruce budworm damage in the Lake States. Studies recently completed in the Lake States have shown that the amount of damage resulting from spruce budworm defoliation in spruce-fir stands is strongly influenced by stand characteristics. For example, in mixed stands containing not only spruce and fir but also various other tree species not fed upon by the budworm, such as aspen, birch, and pine, damage was slight to spruce and fir growing beneath or in the shade of the non-host trees. In contrast, damage was severe to spruce and fir growing in the open, though only a few yards away. Further research may reveal how to incorporate this finding into recommendations for the management of these stands in ways to prevent destructive outbreaks from occurring.

Low winter temperature affects bark beetle infestations in the Southwest. Important bark beetle enemies of ponderosa pine in Arizona and pinyon pine in New Mexico are Ips lecontei and Ips confusus, respectively. Recent studies have shown that populations of both of these bark beetles are subject to decimation by low winter temperatures. This was concluded on the basis of laboratory findings which showed that up to 100% kill of Ips confusus occurred when beetles were removed from bark and exposed to 0° F. temperature for 3 hours; up to 100% of Ips lecontei beetles were killed when exposed for 3 hours at 5° F. These findings indicate that trends in populations of these bark beetles can be predicted by using temperatures recorded at weather stations. This would be of particular value to insect control personnel in deciding where to apply or not to apply direct control measures.



Forest Service scientist extracting constituents from pine bark that are important in the nutrition of bark beetles. The role played by nutritional constituents in pine bark in determining the susceptibility of trees to bark beetle attack and damage is, in most cases, unknown. The subject is being investigated with the hope that information will be obtained which will be helpful towards a better understanding of the cause of destructive outbreaks.

Figure P-3

(22) Forest Disease Research \$2,043,000

No program increase is proposed for 1966.

Research on diseases in forests, forest tree nurseries, and on decays and stains of forest products provides the basic information on the causes of diseases and on practicable and effective methods of combating them. Included is identification of pathogens and investigations of their life histories; determination of the environmental conditions that result in disease epidemics in forests; development of direct control by chemical and mechanical methods, and indirect control through silvicultural practices and genetic resistance; and improvement of disease survey techniques. In the products field, research is directed to the determination of methods of handling logs and lumber to prevent fungus infection; of the proper use of naturally durable or treated wood in high-hazard locations; and of improved structural design to reduce decay of wood in service.

Forest disease research develops the scientific knowledge on which prevention and control of a wide variety of pathogens rests. Detailed knowledge of tree diseases, their preferred hosts and favored environments, permits several sound approaches to control; development of cultural practices favorable to forest trees but unfavorable to disease; selection and breeding amongst the hosts for genetic resistance; recognition of potentially dangerous foreign pathogens that they may be excluded by effective quarantines, thus avoiding another disaster or costly control program such as the chestnut blight or white pine blister rust; and direct preventive or curative treatments.

Emphasis in research on disease control is placed on cultural practices that can be incorporated at minimum cost into daily stand management practices, but all approaches are explored where appropriate. For example, research has shown that prevention of fire, reduction of logging wounds, and lowered ages at which timber is harvested will drastically reduce losses from some of the heart rots, which as a group are the number one disease problem; that ribes eradication will control white pine blister rust, and more recently that proper recognition of climatic influences will drastically reduce the needed control area in the Lake States and in California; biologic and economic studies show where thinning and pruning for dwarfmistletoe control can best be combined with other timber stand improvement measures to improve future yields; good progress has been made in selecting and breeding for genetic resistance to white pine blister rust, fusiform rust, and chestnut blight; and direct application of chemicals has reduced losses tremendously in forest tree nurseries.

In spite of substantial progress in lessening the impact of diseases on forests, we still lose billions of board feet of timber each year to an array of organisms such as bacteria, fungi, viruses, nematodes, and even flowering plants. In some situations, we are committed to long-continuing high annual disease control expenditures, such as for white pine blister rust, until better methods are found. Intensive forestry, now gaining in the South and West especially, is continuously harassed with disease problems. Soil-borne diseases and related root rots are presently less understood than any other category of forest tree diseases. Yet, the upsurge in reforestation and afforestation, often by planting a single species over extensive areas, is intensifying these and other plantation diseases.

The program for 1966 will emphasize the search for sounder and more effective controls of forest tree diseases based on better knowledge of the organisms and how they are affected by various environments, how antibiotics suppress fungus infections in trees, and how soil organisms interrelate and operate to cause root rots. Work will continue on developing an understanding and control of heartrots, vascular diseases such as oak wilt, rusts, leaf-destroying fungi, and the dwarfmistletoes of western conifers. Research on preventing decay to wood used in structures also will be emphasized.

Examples of Recent Accomplishments

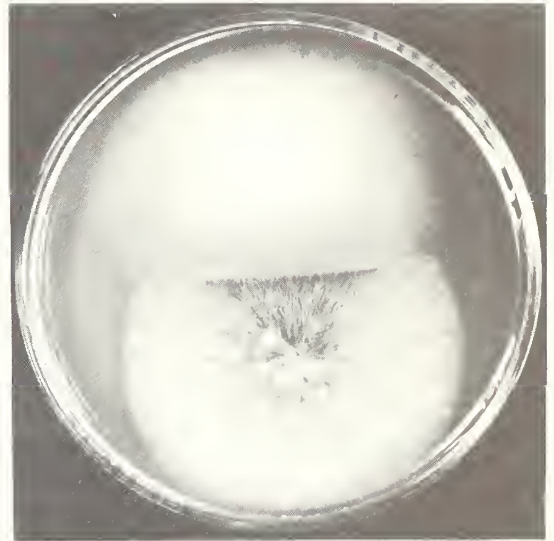
Mycorrhizae aid disease prevention by protecting tender roots. The role of mycorrhizae in the life of the plant upon which they develop has been the subject of considerable controversy over the years. Evidence has accumulated that mycorrhizal fungi, through formation of mycorrhizae, improve mineral absorption and thus are beneficial to plants. Contradictory evidence indicates that at best mycorrhizae fungi are rather weak parasites on the host trees. Our recent research supports the hypothesis that mycorrhizae improve the absorption of nutrients and at the same time actually benefit trees by protecting delicate roots from attack by soil pathogens. Mycorrhizal fungi may protect roots by (a) utilizing surplus carbohydrates and thus reducing attractiveness of the root to pathogens, (b) serving as a physical barrier to infections, (c) secreting antibiotics and/or (d) attracting protective rhizosphere organisms. (See Figure P-4.)

Fungi produce mycorrhizae on sweetgum roots. Studies of mycorrhizae so far have been almost exclusively related to coniferous tree species. Both the need for conifer production in forest tree nurseries and the relative abundance of mycorrhizae on conifers made it natural that this be so. In recent years, however, it has become apparent that mycorrhizae in relation to hardwoods also need

intensive research. Numerous hardwood tree species have been afflicted by diseases that appear to be related to root physiology, including water absorption and tree nutrition, thus raising the question of mycorrhizal relations. Sweetgum is one example of a tree species so affected. During the past year investigations of the mycorrhizal complex on the fine roots of sweetgum have been undertaken for the first time. Nearly 200 possible mycorrhizal fungi were recovered in culture from sweetgum roots. Some of these fungi produced mycorrhizae when introduced into sterile culture of sweetgum seedlings. Some fungi proved to be parasitic and others produced beneficial mycorrhizae only at certain levels of acidity. Elaborations of these findings should be of benefit to silviculturists and pathologists concerned with the management and protection of hardwoods.

Possibility of biological control of *Fomes annosus* explored. To date our most effective control of this root pathogen that has become very destructive in planted pine stands in the South, has been the treatment of fresh-cut stumps with chemicals to prevent infection and subsequent spread to residual healthy trees. Replacement of chemical treatment with an equally effective biological control would be desirable. Research has recently isolated from roots of *Fomes annosus* infected pine several fungi that appear to restrict the pathogen. These fungi were selected by inoculating freshly dug root sections with *Fomes annosus* at one end and the test fungus at the other. Records were kept of ability or inability of the test fungus to block the growth of the pathogen. Further knowledge of the antagonistic fungi may make it possible to encourage them under field conditions and thus control or retard the root rot fungus through biological manipulation.

Organic soil amendments control root rot. Applications of organic materials to forest nursery soils have been made for many years. The reasons are numerous. Soil fertility and physical structure are usually improved. Organic materials increase water retention and at the same time may improve drainage. Also, in recent years there have been many indications that organic amendments significantly change the number and kind of microorganisms in the upper soil horizons where most plant roots are concentrated. Field tests reveal that effective control of *Fusarium* root rot in pine seedlings has been obtained in this way. The best control was obtained when ponderosa pine litter mixed with humus was applied at the rate of 100 tons per acre. Laboratory studies showed that all treatments used significantly increased the soil microbial population, particularly species of *Trichoderma* and *Streptomyces*. Both of these fungi are known to be antagonistic to a variety of pathogenic organisms. Continued work in this area of research should yield more specific treatments to benefit forest nurseries and plantations.



Biological control of tree root pathogens may be obtained through the action of beneficial soil fungi that form a protective mantle (Mycorrhizae) around the small feeding roots. In the three photographs, the uppermost fungus in each case is the mycorrhizal fungus. The lower fungus is the pathogen. From top to bottom, the mycorrhizal fungus suppresses, limits, or overgrows the root pathogen. Evidence is available that such fungi are capable of preventing root infections in forest soils. Research is in progress to determine how to increase their number and effectiveness.

Figure P-4

(23) Forest Products Utilization Research \$5,890,000

An increase of \$489,000 would be used to give increased emphasis to critical utilization problems, including those in such distressed and underdeveloped areas as Appalachia and the northern Lake States. The planned research would provide a sounder basis for determining the quality and improving the performance of wood in relation to its use, in order to aid industry in overcoming growing competition from other materials and in retaining or increasing markets for wood-based products. Included would be research to improve performance of wood in housing; performance standards for transmission poles, bridge timbers, laminated beams, and other structural timbers; and major emphasis on improved and new uses for low-grade hardwoods. Some program readjustment will be made for greater efficiency in the overall work.

The aim of the forest products research program, which is centered at the Forest Products Laboratory with a field project at each of the regional Forest and Range Experiment Stations, is to contribute to the solution of national and regional utilization problems of all types, especially to problems of rural area development that often are related to improved utilization of the timber resource; to reduce unused woods and mill residues to a minimum by finding uses for present residues; to develop new products; and to improve the serviceability and lower the costs of existing products. Its broad aim, in brief, is to develop new utilization outlets for thinnings, unpopular and little-used species of timber, logging and milling residues, and to make the whole timber crop on farms and other forest lands go further and give better service in a wide variety of uses for lumber, paper, chemicals, and other products derived from wood.

The timber-using industry is an important part of our present economy. In 1959 the total value of shipments from timber-based primary manufacturing industries amounted to over \$10 billion. About 5% of the Gross National Product originated in timber-based industries. One out of every 20 people employed in the United States worked in these industries. A raw material base for a greatly expanded industry is available in little-used species, in low-value timber, and in logging and milling residues. Research in forest products utilization is needed not only to give stability to the present industry but also to develop a technical basis for new industries.

The Federal Government has a strong interest and responsibility in the public aspects of forest products utilization research. The industry in general is a complex of many small companies. Even the largest are small in comparison to those of other basic industries

with whom they compete, i.e., aluminum, steel, plastics, and petroleum. One single large petroleum-using company employs more researchers than the entire timber-using industry. There are very few forest products companies who can finance a research program. Those that do are largely interested in product developments which will give them a competitive advantage; they pay little attention to finding uses for the poorer species and sizes of trees often in abundance.

More complete use of the timber crop is essential for profitable forestry. The problem is especially acute on the considerable acreage of timber in small ownership. Here the continued "creaming off" of the better timber has resulted in a residual stand of low value under present use standards. Research is needed to develop uses for this presently unmarketable timber. Many of the areas currently experiencing severe economic distress must look to full and effective use of their timber resources as the primary means for permanent improvement of their economic situation. The Federal Government itself markets over \$150 million worth of timber each year. The value of this timber can be greatly enhanced by the development of more profitable uses. Also proper forest management will be facilitated by developing markets for thinnings and other low-value timber.

The 1966 program will support basic and applied research in forest products utilization, aimed at furthering intelligent and profitable use of the timber crop. The work involves the development of new and improved processes and uses, the improvement in the serviceability of wood in use, and characterization of timber and timber products for specific end uses. Attention will be focused on the problems of developing new and improved industries for areas now experiencing economic distress. Emphasis will be given to the utilization of hardwoods which are abundant in most of these depressed rural areas. More attention will be given to applied and developmental research which would result in the early establishment of new industries.

Examples of Recent Accomplishments

New conversion system produces laminated beams from southern pine. From Virginia to Texas, southern pine forests abound today in 8- to 12-inch logs, many of which should be harvested to thin stands and improve growth on the residuals. Too good for pulpwood, not large enough for profitable lumber or plywood, these logs need a new and better market outlet. According to a recent feasibility study, they can be manufactured into continuous high-quality laminated beams. To make the operation profitable, new, specialized machinery is being developed. The planned process uses a newly invented headrig to convert barked logs into smooth square cants. All residues become salable pulp chips. The cants are sliced green to veneers 0.6-inches thick. After rapid drying

by a new "jet" process, the veneers are machine-graded for stiffness and fed into a finger-jointing and gluing machine which directs stiffer pieces to the outside of the beam. Following electronic gluing, the continuously-produced beam is sawn to market lengths. Beams manufactured in simulation of this process were as strong as the higher commercial grades made from costlier raw material. Given the needed new machinery, a \$1,700,000 investment by industry in plant and working capital could employ some 136 people to produce 2,750 cubic feet of beams and 188 tons of pulp chips daily. The timber resource is available for a number of such plants.

Wood houses perform well in the Alaskan earthquake. Recommendations on house construction, based on Forest Products Laboratory research results, were substantiated by the excellent performance of wood-frame houses in the record-breaking earthquake at Anchorage, Alaska. Study of damages in this area showed that houses with plywood sheathing or lumber sheathing and bracing, and enclosed with wood or some other rigid type of siding, were virtually undamaged when outside the major slide areas. Even in the areas where severe earth slides occurred, properly constructed wood-frame houses retained much of their structural integrity. The importance of proper nailing of sheet materials was effectively demonstrated. Houses with comparatively low-density sheet materials well nailed in place did not fail until the sheathing was torn apart, while others, with denser but improperly nailed materials were distorted appreciably because fastenings tore out. The excellent performance of well-constructed wood-frame houses probably had much to do with the low casualty list, since they provided safe refuge to the occupants during the long shock period. (See Figure Q-1.)

Stress analysis of wood frames solved by new computer program. Modern high-speed computing techniques recently solved problems in structural design so complex that they are virtually unsolvable by ordinary methods. Timber structures, typically framed by a succession of similar members, require complex analysis to determine load distribution among those members. In the past, various approximations have been utilized, none entirely satisfactory. The newly developed method uses simultaneous slope-deflection equations which can be put into matrix notation for solution with a high-capacity digital computer. Distribution of wind forces among the members of pole-type wood buildings was determined by this technique and indicated disposition of forces as well as areas of maximum stress. Mathematical analysis of wheel load distribution among the stringers of a timber highway bridge was also carried out by this method. This analysis and the confirming experimental research provide for efficient and economic design of timber bridges and will encourage their proper utilization.

New pulping process eliminates stream pollution. The original neutral sulfite semichemical process, developed by the Forest Products Laboratory, which brought hardwoods prominently into use for the first time for paper making and is now used by many mills, has now been further improved by modifying it to permit relatively low-cost elimination of stream pollutants. A modified process, called bisulfite semichemical pulping, can be used to make corrugating medium and other packaging board products. A magnesium rather than sodium base is used because magnesium bisulfite can be recovered by use of a relatively simple principle adaptable to a fluidized bed combustion furnace. Since this recovery system is much less expensive to install than conventional pulp chemical recovery systems, it becomes practical for comparatively small mills to burn their effluent, thus eliminating pollution problems. The development was demonstrated in a recent full-scale trial at a corrugating board mill. Up to 90% of the pulping chemical was recovered with only a small drop in pulp yield. All hardwoods as well as softwoods may be pulped with this new pulping process.

New fire retardant developed for wood shingles. Growing popularity of wood shingles and shakes in contemporary houses has brought a major revival of the market for these products. However, recent fires in California involving many homes with wood shingles and shakes have emphasized the urgent need for more permanent fire-retardant treatments. Fire retardants in the past have consisted of waterborne salts with poor resistance to leaching by rain water. The Forest Products Laboratory has investigated a tetrakis (hydroxy methyl) phosphonium-urea and melamine-resin system developed by the Southern Utilization Laboratory of the Agricultural Research Service for use as a washable fire-retardant treatment for fabrics. We found in our studies that when these chemicals, dissolved in water, are applied to wood, they polymerize in place to form an insoluble resin. Although not as effective under severe fire conditions as inorganic salts where leaching is not a problem, the chemical-resin system showed excellent promise on wood shingles and shakes. With this treatment the shingles have passed a burning brand test required for Class C roof covering materials. Several companies are now actively studying the commercial possibilities of this treatment.

Fiberneer--a new container material is developed. Combining the attributes of wood with the advantages of fiberboard forms a new product--Fiberneer. It provides the stacking strength and resistance to wet or humid conditions needed in many uses of fiberboard containers. Thin layers of paper-overlaid veneer (high-strength facings) have been bonded to the corrugating medium (low-density core) according to Forest Products Laboratory-developed design criteria established for sandwich

construction to form a strong, rigid container. Placement of the veneer in the facings takes advantage of its inherent strength under both normal and wet conditions. Containers of Fiberneer have been made in a pilot run on conventional corrugated-box fabricating equipment and converted into containers. Fiberneer, although only about 1/2 as heavy and 1/3 as thick, develops strength approaching that of triple wall container board and will retain more of that strength when wet.

Improved log grades developed for Douglas-fir. A new system for grading inland Douglas-fir logs in standing trees has been developed. It has been recommended for standard use by the Forest Service on an interim basis in the 11 Western States. The new grading system has fewer grades, is easier to learn and apply, and segregates logs into value classes more accurately than do the systems it replaces. After lumber yield tables have been developed for the new log grades, usage of the new grading system is expected by other Federal agencies and by industry. It will replace at least two less satisfactory systems now being used.

New microscope technique speeds studies of wood structure. A new microscope technique has enabled Forest Service scientists to make rapid and accurate measurements of wood cells and thereby greatly speed the collection of essential data for the comparative evaluation of wood in old-growth and second-growth trees. Results highly important to geneticists, forest managers, timber owners, and wood products manufacturers have already been obtained on redwood, and work is being pushed on Douglas-fir and southern pine. The hollow cells, which are the tiny building blocks of wood, are of key importance. Their size and wall thickness, however, can be evaluated only with a microscope. The new technique maintains an accuracy within millionths of an inch. It is fast and simple. Slides, staining, and other techniques are eliminated; a cross section of a tree trunk can be studied directly. An undergraduate student made upwards of 60,000 measurements of cell diameter and cell-wall thickness in a summer's work in 1963. It was shown that variation in specific gravity--a basic indicator of strength, pulp fiber quantity, and other key properties--is 99% accounted for by variation in cell diameter and wall thickness. Statistical comparison of measurements of wall thickness with calculated data based on specific gravity and number of cells per unit area gave an error of estimate within a few millionths of an inch; much larger differences are common with older methods. (See Figure Q-2.)

Project (23)

Wood molasses from stream pollutant. During the past year a major hard-board manufacturer has gone into the production and marketing of a wood-byproduct carbohydrate concentrate. This large-scale operation will turn a former stream pollutant to profitable use. It is significant in providing for the first time wood molasses (solubilized wood carbohydrate) for animal feed and for industrial use. This operation improves the company's raw material utilization, and can add the better part of a million dollars to revenues. Significantly, this important advance may well prove to be the first step in development of additional related chemically derived products. This commercial development was made possible by the results of some of the basic research at the Forest Products Laboratory directed toward the chemical utilization of wood residues and byproducts.



Shock resistance of wood-frame houses was spectacularly demonstrated by this dwelling during the record-shattering Good Friday earthquake at Anchorage, Alaska.

Figure Q - 1



Measuring and counting of tiny wood cells is greatly speeded by microscope technique developed for study of wood structure. Measurements are made directly from cross section of tree trunk, obviating need for slides and special staining and other techniques.

Figure Q-2

(24) Forest Engineering Research \$409,000

No program increase is proposed for fiscal year 1966.

Forest engineering research involves developing new systems and techniques of forest resource production, protection, and utilization designed to lower costs and improve the efficiency of operations. It is concerned with better engineered performance and mechanization in the more complex aspects of multiple use practices. Multiple use requirements dictate that new and sometimes revolutionary systems be developed to facilitate protection and optimum production for all uses of the forest under intensive management practices.

Vastly improved transport and harvesting methods are needed to assure protection of soil and water resources, to harmonize timber harvesting with other multiple use requirements such as scenic values or recreation, and to avoid loss of timber-growing areas to road rights-of-way. Industrial research in engineering for forestry purposes has been confined to specific equipment for scattered unrelated projects with relatively limited objectives in contrast to research on coordinated systems required by multiple use considerations. The Forest Service's engineering research program is designed to fill this latter need. The relative inaccessibility of many National Forest lands and their high values for recreation watersheds, wildlife, and timber require strong engineering advances.

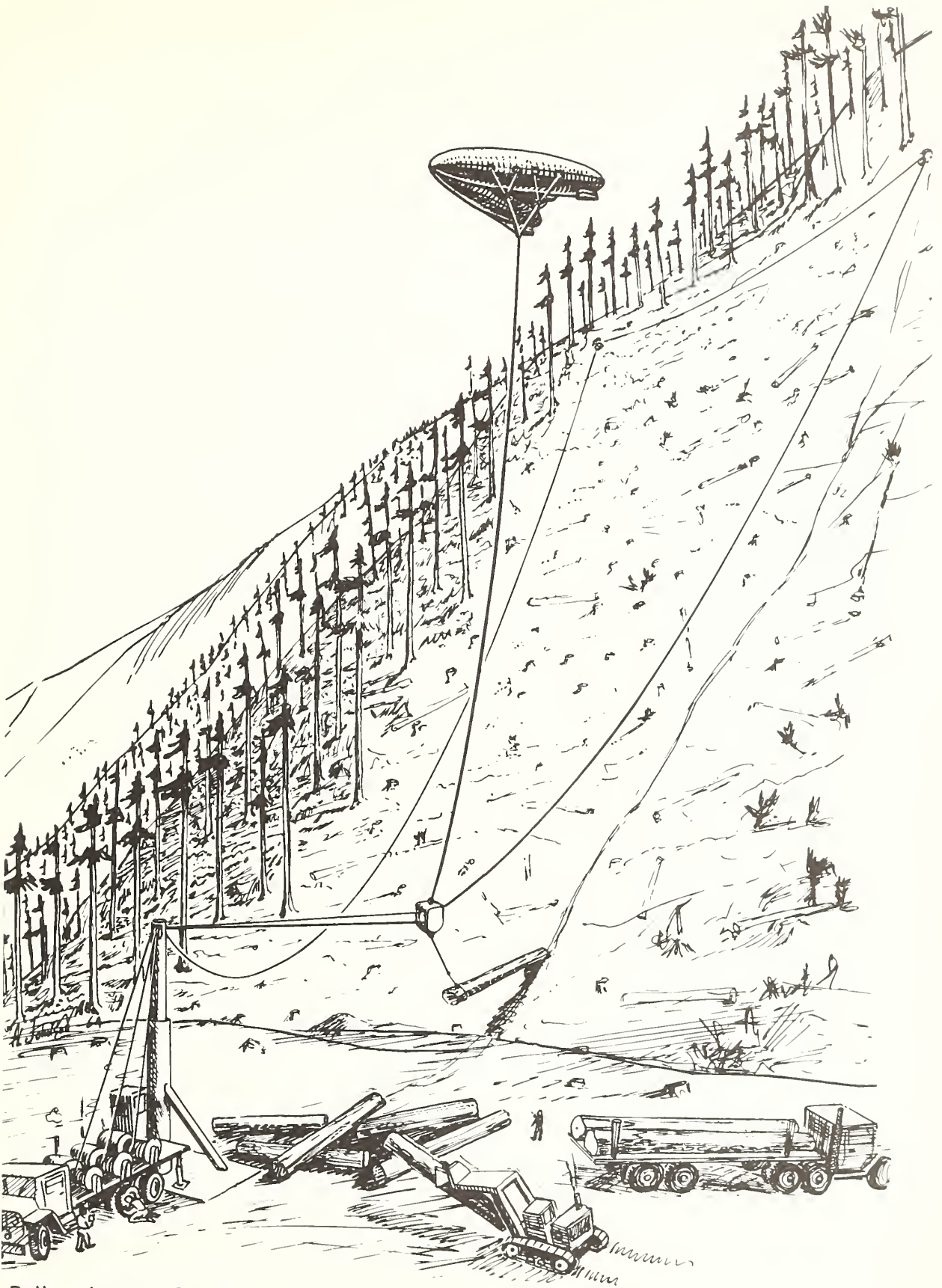
It is estimated that in Oregon and Washington alone there are at least 28 billion board feet of timber characterized by low volumes per acre, steep terrain, or costly road access which will require special harvesting and removal techniques, such as by helicopter, systems using balloons for added lifting power, or other systems and machines specially developed to accomplish harvesting of this timber. In Alaska, there is an estimated 61 billion board feet of timber which cannot be successfully logged with conventional systems because they are either too costly to the operators or too damaging to soil, water, and scenic values. Logging systems and equipment specially designed for economical timber harvesting and cultural operations on small woodland ownerships are nearly nonexistent. Specialized equipment is urgently needed for this purpose. In eastern hardwoods, some 74% of the total volume is considered low grade and culls. Vastly cheaper harvesting methods must be developed if such low-quality timber is to be removed economically and the sites replanted to better species. Moreover, sharply reduced nursery and planting costs are needed to accelerate the job of replanting idle or poorly-stocked commercial forest land.

Project (24)

In fiscal year 1966 emphasis will be placed on evaluation and adaptation of balloon logging systems in the Pacific Northwest and Alaska; low-cost transport of wood pulp chips by pipeline or other methods that will permit economic utilization of small-sized timber; better engineered systems of harvesting low-grade timber on small forest properties and mechanization of harvesting and site conversion.

Example of Recent Accomplishments

Balloon logging systems. The completion of a feasibility study of balloon logging points the way to more economical and more efficient ways of moving large logs in rough country. This study represents the first large-scale application of systems engineering research to logging problems. Not only does the study provide data needed to justify field trials of the new method, but it also pioneers new techniques that will be useful in all forest engineering research. (See Figure Q-3.)



Balloon Logging System

Figure Q-3

(25) Forest Survey \$1,903,000

No program increase is proposed for fiscal year 1966.

The Forest Survey provides a continuing inventory of the area, location, and condition of forest lands, amounts and quality of timber volumes available, rates of timber growth, timber cut and mortality, ownership of forest land and timber, and trends in timber consumption. The forest resources of the Nation, comprising some 758 million acres, vary greatly in productivity and availability for industrial use and show widely divergent trends in growth and depletion. Federal, State, and local forestry agencies need up-to-date knowledge of the changing trends in timber supplies to provide an evaluation of the effectiveness of and needs for forestry programs. Also, because of increasing pressures generated by the various uses of forest land, and rapidly changing resource and industrial conditions, forest industries rely more and more upon the Forest Survey for resource information essential to business decisions regarding land acquisition, wood procurement programs, and the feasibility and locations of new or expanded industrial plants.

Examples of Recent Accomplishments

Progress is made nationwide on forest surveys. During the past year field surveys have been under way in all sections of the country including Alaska, Washington, Oregon, California, Arizona, Kentucky, Maryland, Pennsylvania, North Carolina, Alabama, and Louisiana. Survey findings have been made available in a number of reports by States and in various special regional or local reports relating primarily to rural area development programs. Appraisals of present and prospective timber supplies in the various States and regions provide a factual basis for location of forest industries and development of public forestry programs, including rural area development.

Wyoming has a substantial forest resource. The first survey of Wyoming recently completed indicates a timber volume of 22.6 billion board feet on 4.9 million acres of commercial forest land. Sawtimber stands, largely overmature, occupy three-fifths of the commercial forest area. These ample supplies of timber are favorable to opportunities for increasing the cut of forest products along with the development of other values for water, recreation, and grazing.

New Hampshire's forest land increasing. A resurvey of New Hampshire's forests showed that since 1946 the area of forest land has increased 5%, mostly as a result of abandonment of farm land. No county in the State now has less than 80% of its land area in forests. Many changes are

Project (25)

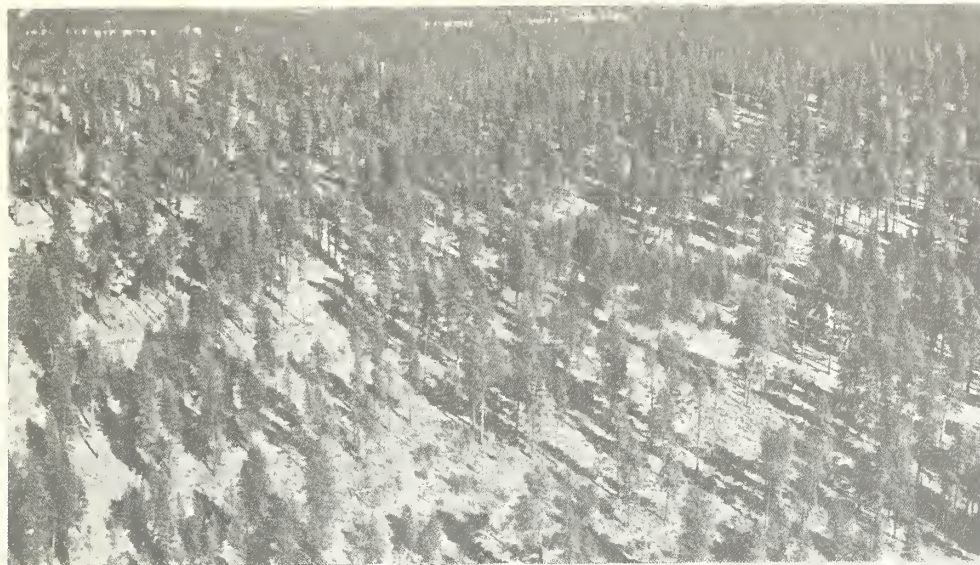
occurring in the timber inventory although the total cut of sawtimber has been approximately in balance with growth. Lumber continues to be the leading timber product obtained from these forests, with the pulp and paper industry using about one-half as much wood as the lumber industry.

Forest acreage increases in Georgia and Alabama. Recently completed resurveys show an increase of 21% in the commercial forest area in Georgia in the past 25 years. In Alabama, forests have increased 5% since 1953. In both States increases in area have resulted from planting and natural reseeding of former cropland. In Georgia growth of softwood timber now exceeds the cut, but growth of hardwood sawtimber is falling short of replacing the cut. Volumes of high-quality hardwoods suitable for factory lumber and veneer have declined precipitously in both States.

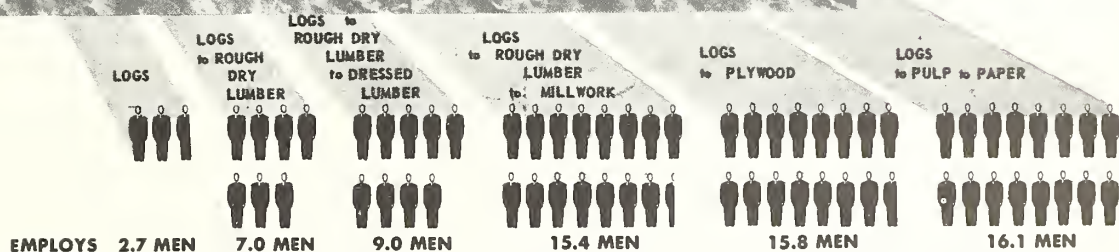
Industry problems and opportunities of Eastern Oregon explored. A recent survey of Eastern Oregon, published in a report entitled "Toward Complete Use of Eastern Oregon's Forest Resources," shows that Eastern Oregon contains 11.5 million acres of commercial forest land with a total volume of sawtimber of 125.5 billion board feet. Over 90% of the timber cut in this area goes into one product--lumber. The report indicates that future economic growth and development will depend to a major extent upon full utilization of the timber resource through product diversification, remanufacture of lumber, and development of wood-using industries based on plant residues and species and sizes of material not currently used. As illustrated in Figure R-1, conversion of 1 million board feet of standing timber to logs provides 2.7 man-years of employment; conversion to rough dry lumber provides 7.0 man-years; production of millwork 15.4 man-years; and manufacture of pulp and paper a total of 16.1 man-years. At present about 8.5 man-years of employment are provided in Eastern Oregon for each million board feet of timber harvested, compared with 20.0 man-years in Western Washington where timber industries are more highly diversified.

This survey of Eastern Oregon also points out, as also illustrated in Figure R-1, that in the process of converting old-growth forests to managed young stands it would be desirable to reduce the present cut on private lands, but that an increased harvest can be sustained when stands are fully regulated. On public lands the present annual cut could be increased by greater use of the less desirable species, and ultimately built up by intensified management to a materially higher level than the present cut.

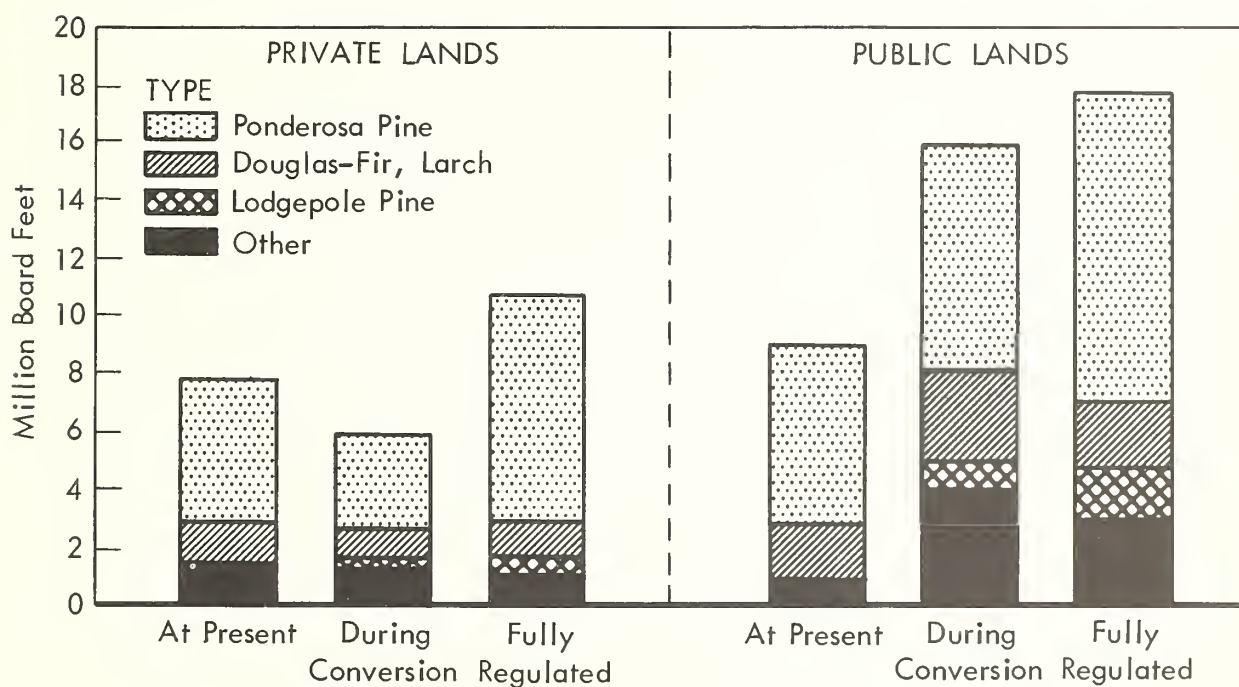
CONVERSION IN ONE YEAR OF ONE MILLION BOARD FEET OF STANDING TIMBER



TO.....



Gains in employment possible through diversification. Survey -- Eastern Oregon.



Estimated average annual sawtimber harvest by forest type, at present, while being converted to a regulated forest and when fully regulated. Eastern Oregon.

Figure R-1

(26) Forest Products Marketing Research \$1,464,000

An increase of \$325,000 would be used for investigations aimed at expanding and strengthening markets for timber products. Research would determine trends in the amount and kind of timber products and competing materials consumed in construction, manufacturing, and shipping; and ways to overcome competitive factors in wood products markets. Ways would be sought to improve those techniques of harvesting, processing, and selling forest products that influence marketability, and thus meet better the needs of consumers, making more complete use of the newly constructed facilities at Princeton, West Virginia, in this research.

Forest products marketing research includes a wide variety of studies aimed at expanding uses of wood through development of more efficient arrangements and practices for harvesting, processing, selling, and distributing forest products. Marketing research also includes studies to appraise the feasibility of new or expanded timber industries, particularly plants based on low-quality timber of little-used species and the available resources in economic problem areas. Other research involves comprehensive analyses of trends in consumption and potential future demands for lumber, pulp and paper, and other wood products for construction, manufacturing, shipping and other end uses, and the relation of prospective markets and timber supplies.

Many forest landowners fail to realize full returns from timber management and harvesting because of lack of market knowledge and ineffective timber marketing systems. Moreover, inefficient processing and marketing of timber products results in low returns to many wood-processing industries and difficulties in competing with nonwood materials in many consumer markets. Development of new or expanded markets for wood products is of importance to several million landowners and wood processors and is especially needed in low income rural areas in need of economic development. Furthermore, the studies to appraise the outlook for future timber requirements and prospective markets is of particular importance both to wood-using industries and to Federal and State forestry agencies in guiding formulation of forestry policies and programs.

Emphasis during fiscal year 1966 will be given studies of possible methods for increasing efficiency and lowering costs in the harvesting, processing, and marketing of forest products. Market development studies will determine the quantity, location, and kinds of timber available in specific areas, and the economic feasibility of establishing new or expanded wood-using industries, especially in heavily forested low-income areas. Research on timber valuation and pricing procedures will include methods for estimating logging and milling costs, end-product values, and

Project (26)

profit allowances as a basis for improved appraisals in marketing both public and private timber. Studies also will be continued of nationwide trends in present and prospective demands for wood products and competing materials and the outlook for wood in various markets. Such information, together with projections of timber supplies, is vitally needed for judging the Nation's timber situation and outlook and the need for major forestry programs.

More efficient production at Alabama sawmills preserves markets. Since World War II many changes have occurred in the southern lumber industry. In Alabama, for example, there are now only one-fifth as many sawmills as in 1946 and total lumber production has shrunk by one-half, but average annual output per mill has doubled. A study of 47 Alabama sawmills, cutting from 12,000 to over 55,000 board feet of lumber per day, indicated that successful operators found it necessary to make substantial investments in new equipment to reduce waste, increase production efficiency, and better meet changing markets. Purchases of mobile log and lumber handling machines, automatic carriages, and resaws increased output and reduced costs per unit of production. Addition of dry kilns, planers, and other finishing machines provided versatility needed to meet consumer demands. Widespread installation of log debarkers and chippers added \$6 to \$8 of gross income per thousand board feet of lumber produced through sale of pulp chips from slabs and edgings. This study also showed that most mills could further increase productivity, sales, and net returns through improved log-making and log-buying practices, better adjustment and maintenance of machines, more accurate cost accounting, and increased attention to marketing and distribution.

The role of retail dealers in distribution and marketing of lumber becomes more diversified. Recent years have seen some striking changes in the role of retail dealers in distribution and marketing of lumber. Though roughly half of their sales dollar is still from lumber, dealers are rapidly increasing the number and depth of supplemental lines of merchandise. The retailer's share of the house materials market has been cut sharply by the trends toward large housing developments and increased production of manufactured homes for which materials are bought direct from wholesalers or from manufacturers. Convenience, service, and liberal credit offered by retailers have helped retain the business of small builders, but most sales, particularly of small- and medium-size dealers, are now for home improvement and repairs both to small contractors and to do-it-yourselfers (Figure R-2). Most dealers are indifferent to trademarked lumber and are conservative in taking on new products, but increasing numbers now sell prefinished products and precut and prefabricated components which eliminate difficult on-the-job operations and improve performance.

Analysis made of factors affecting location of northern Appalachian wood-using industries. Establishment of new or expanded industries to use timber now in surplus supply could provide much-needed employment and community development in areas such as the Appalachians and

the northern Lake States. The various public and private agencies working to develop these areas need to know the relative importance of factors governing choices of sites by different timber industries. A study covering four wood-using industries of the northern Appalachians--lumber, furniture, particleboard, and wood pulp--showed that cost of wood, labor and transportation are generally the most important production factors in deciding the choice of location for new production facilities. Some factors such as State and local taxes, local financial assistance, and the cost of industrial sites, which have been stressed by development agencies in the past, were found to be of relatively little importance to the industries covered.

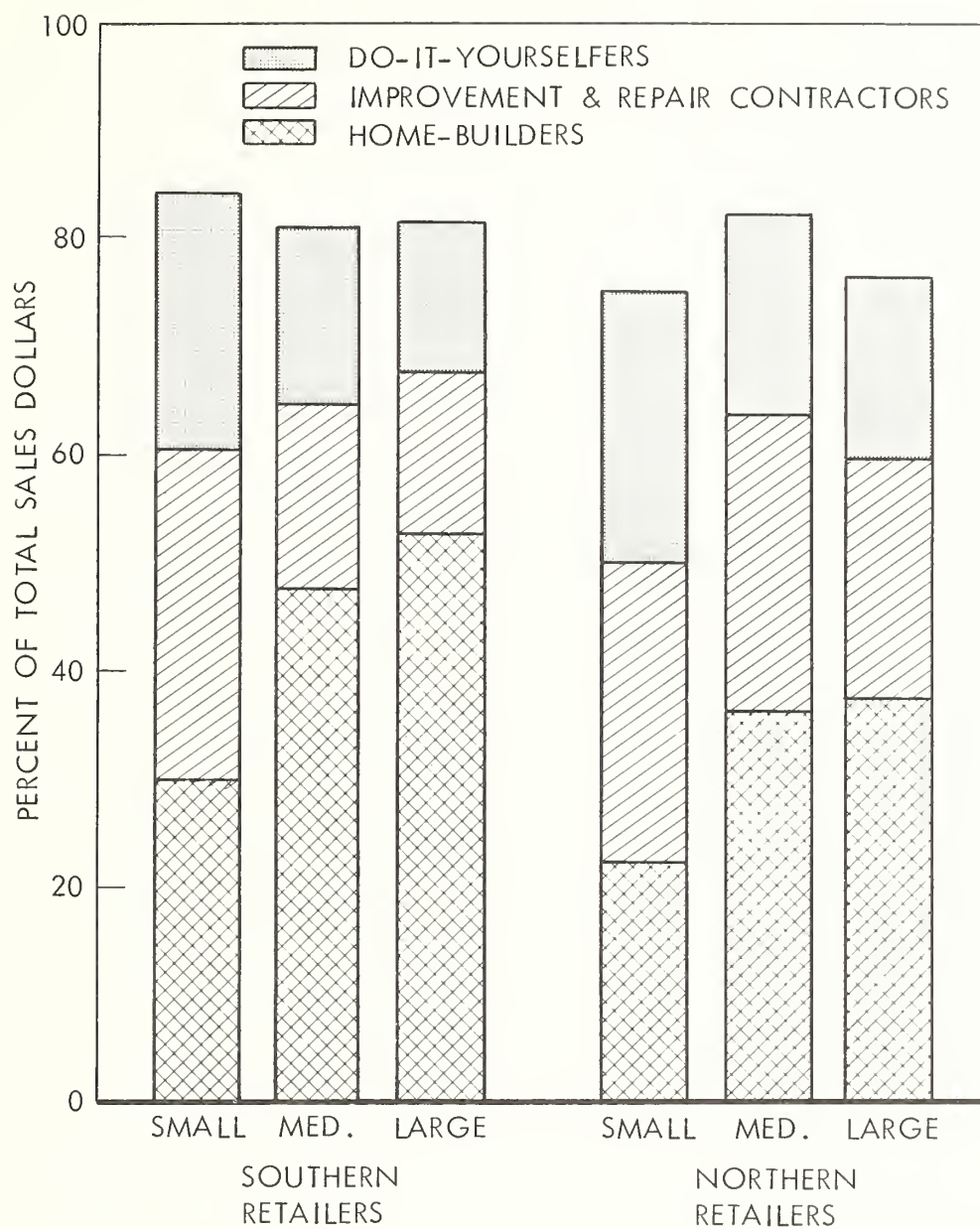
Hardwood flooring share of the residential construction market in steady decline. An analysis of hardwood flooring production and use showed that this industry has been consuming about 20% of all hardwood lumber produced annually during recent years. Nearly nine-tenths of this was made up of lower grades of red and white oak lumber from the southern and Appalachian hardwood regions. Although the volume of residential construction, where nearly all oak flooring is used, has been increasing, annual production and shipments of oak flooring have declined steadily since 1955. Oak's share of the flooring market dropped nearly 50% during this period.

Two major factors which have affected markets for hardwood flooring are the difficulties, real or imagined, of installing hardwood flooring on concrete slabs, and the opinions of architects, builders, and homemakers regarding relative ease and cost of maintaining wood and other types of floors. Factual information about these and other problems is being obtained to determine what is needed to hold and expand the important wood flooring market.

Wide variation found in wood use in nonresidential construction. Studies of wood use in nonresidential construction show that the amounts of lumber and plywood used per dollar of construction cost vary widely among construction types. During 1962, for example, lumber use per dollar of expenditure averaged 0.148 board feet for all types of nonresidential construction but ranged from 0.058 board feet for highways to a high of 0.268 board feet for nonhousekeeping structures, such as hotels and motels. Both lumber and plywood were used chiefly for facilitating purposes such as concrete formwork, scaffolding, and fencing. Approximately 60% of the lumber and 69% of the plywood consumed were used for such purposes.

The West is a heavy consumer of wood for nonresidential buildings. Although less than one quarter of the Nation's total dollar expenditure for nonresidential building construction is in the West, more than 40% of the lumber and nearly half of the plywood used in such buildings is consumed in this region.

Lumber consumption in nonresidential construction has declined from 5.4 billion board feet in 1952 to 5.0 billion board feet in 1962, but during the same period plywood consumption increased from approximately 135 million square feet to 2,764 million square feet.



Sales patterns of retail lumber yards represent an important factor in programs to develop wood markets.

Figure R-2

(27) Forest Economics Research \$556,000

No program increase is proposed for fiscal year 1966.

Forest economics research provides information on income, prices, costs, and investment guides relating to use of the 4.5 million individual forest ownerships that make up some 60% of the Nation's commercial forest land, to the management of more than 60 million acres of industrial forests, and to the administration of National Forests and other public lands. This research includes studies involving the economic benefits from establishing, managing, protecting, and harvesting of timber crops; the development of principles and guides for the coordinated management of timber and other land uses for water, recreation, livestock and wildlife; and the evaluation of alternative public and private forestry programs on various classes of ownership.

Pressures on both public and private forest lands for production of timber, recreational services, and other products of the land are steadily increasing, and problems of achieving efficient allocation of capital and administration of forest land have correspondingly intensified. Forest economics research serves to guide actions to achieve increased benefits from the most efficient forest enterprises, and to provide an objective basis for resolving problems and conflicts in an expanding forest economy.

Research in this activity seeks to identify the most promising opportunities for improving forest income and employment and determine possible adjustments in public forestry programs or new measures for improving the level of management and productivity on the vast forest area in small forest holdings. Research will be continued in all important forest regions to appraise the benefits realizable from investments in planting, timber stand improvement, and other land treatment measures as influenced by site, accessibility, markets, and other factors. Studies of the economic aspects of insect and disease control programs relating to white pine blister rust and dwarfmistletoe, for example, will be continued in the West and Northeast as a guide to size and intensity of programs. Research on critical problems of multiple use management will also be continued in the West to help resolve conflicts among recreation, timber, and other forest land uses in problem areas where there is need for improved economics criteria to guide the management of forest land.

Examples of Recent Accomplishments

Future timber supply estimated for the Douglas-fir region. An economic analysis of factors affecting timber supplies in Western Washington and Western Oregon indicated a long-run economic timber growing potential of about 13 billion board feet annually, or about 20% greater than the average annual harvest of 11 billion board feet during the 1950's. This estimate of potential growth was based upon assumed changes in land use, shifts in ownership and, particularly, responses of six classes of owners to economic influences on the business of timber growing. The rate of return on timber capital was considered to be the dominant determinant of the long-run timber output. Stumpage prices were found to have relatively small influence on long-run output.

With present trends in forest management and timber utilization, the prospective timber harvest will gradually decline, according to this study, over the next couple of decades but thereafter will rise to the 13 billion board feet potential. (See Figure R-3.)

Rates of return determined for investments in white pine weevil control. An economic analysis of opportunities for white pine weevil control in the Northeast has provided an evaluation procedure to aid practicing foresters in deciding when to begin control treatments and where control is likely to be most profitable. (See Figure R-4.) Rates of return from weevil control vary widely depending on costs of control, intensity of damage, prospective white pine lumber prices, and the time period between control treatment and final harvest age.

Case study shows how forest investment ratings guide management planning. A case study of the 187,000 acre Elk State Forest in Pennsylvania, carried out in cooperation with the Pennsylvania State Department of Forests and Waters demonstrated how forestry investment guides developed in previous economics research provide a basis for planning the operation and development of public forest properties. Stand conditions were related to capital requirements and expected rates of return, and optimum timber stand improvement programs then defined for alternative budgets.

PERCENT OF TOTAL AREA
PER 20-YEAR AGE CLASS

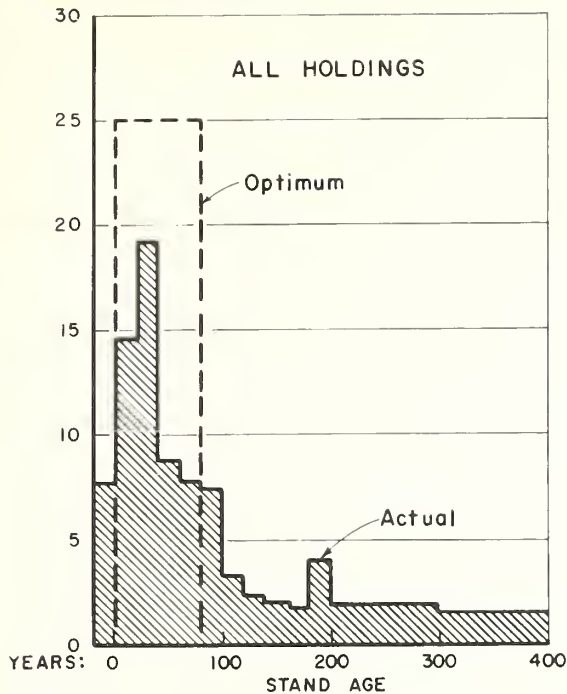


Figure 3-a. Age-class distribution -- Douglas-fir region.

BILLION BOARD FEET
PER 20-YEAR AGE CLASS

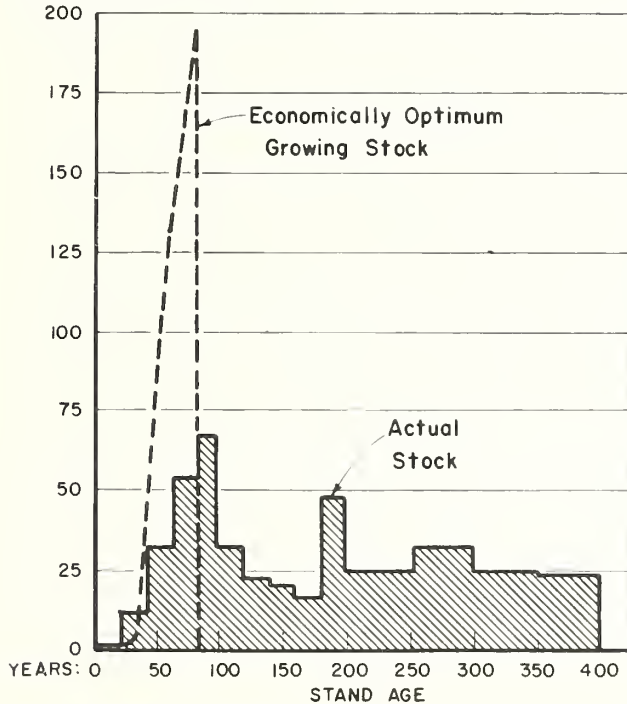


Figure 3-b. Current growing stock and economic optimum growing stock.

BILLION BOARD FEET,
SCRIBNER RULE

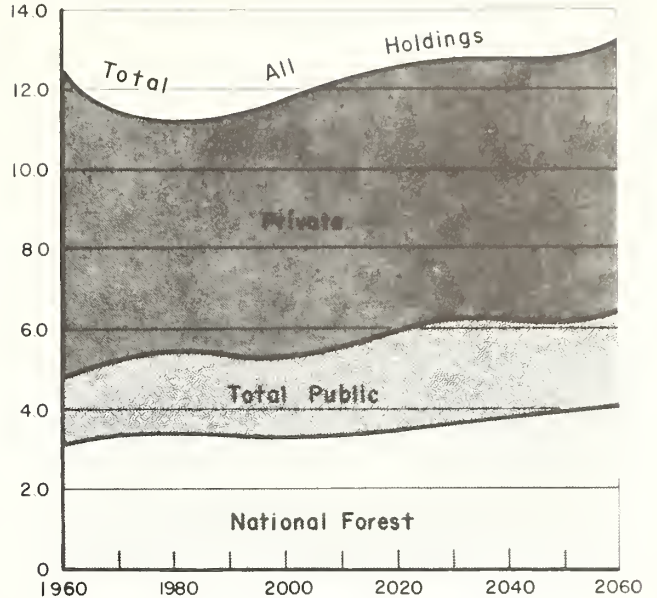


Fig. 3-c. Prospective annual timber harvest -- Douglas-fir region.

Timber Trends - Douglas-fir Region

Figure 3-a illustrates the unbalanced age-class distribution in the Douglas-fir region. Fig. 3-b shows the corresponding unbalanced distribution of capital stock in saw-timber. Using economic rotation ages, the economically optimum stock for achieving the long-term growth potential is about 1/3 of the present level of stocking. Most of the old-growth timber is on public lands.

Fig. 3-c shows the projected timber harvest with present trends in management. Projected decline in cut to 1980 takes place entirely on private lands, largely in western Oregon. After 1980 the private and public harvest projected increases consistently toward the long-run economical potential of about 13 billion board feet annually.



This young white pine has been damaged by the white pine weevil, now the tree's worst enemy . The profitability of weevil control varies widely by such factors as site and tree age .

(28) Forest Research Construction \$1,318,000

A decrease of \$2,683,000 is proposed in fiscal year 1966. The \$1,318,000 would be used to build research facilities for which architectural plans have been completed at two locations. The proposed facilities are at locations carefully selected for research in the 10-year forestry research plan. At each of these locations the Forest Service now has some research underway. The proposed construction is designed to accommodate these present programs and to serve research expansions that are planned to permit more intensive work on critically urgent problems.

A. Forestry Sciences Laboratory

Morgantown, West Virginia \$468,000

Architectural and engineering planning funds were provided for this project in 1964. The plans are scheduled for completion by February 1, 1965. The program to be housed includes research on forest engineering, forest disease, and wildlife habitat management. The objective of engineering research would be to develop new systems of logging, transporting, and handling of wood materials with special attention to safeguarding watershed values on steep mountain slopes. The disease research would be concerned with protection of hardwoods, and the wildlife habitat studies would deal with production of both small game and big game animals in the forest environment. A site for this building has been made available by West Virginia University.

B. Forest Insect and Disease Laboratory

New Haven, Connecticut \$850,000

Laboratory facilities provided on the campus of Yale University were destroyed by fire on March 26, 1964. Replacement space is critically needed and architectural design and plans are now being developed. Plans are scheduled for completion by February 5, 1965; thus construction can proceed in fiscal year 1966. This location is a major center for basic research on the insects and diseases of forest trees of the northeast. A building site has been purchased.

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The 1965 appropriation provided for the following non-recurring construction items:

Forest Products Laboratory, Madison, Wisconsin	\$3,800,000
Berkeley, California	50,000

Design and specifications for the following:

Oxford, Mississippi	35,000
Fort Myers, Florida	16,000
Albuquerque, New Mexico	50,000
Carbondale, Illinois	<u>50,000</u>

Total	\$4,001,000
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Examples of Recent Accomplishments

Laboratories funded for construction in fiscal year 1963 at Tempe, Arizona; Princeton, West Virginia; Logan, Utah; Parsons, West Virginia; and Warren, Pennsylvania were completed. The laboratory at Alexandria, Louisiana, funded in fiscal years 1963 and 1964, was dedicated September 23, 1964.

The architectural and engineering planning funded in fiscal year 1964 for laboratories at Morgantown, West Virginia; Sewanee, Tennessee; Missoula, Montana; Houghton, Michigan; and Fort Collins, Colorado is being completed. Plans will be available so that construction can begin as soon as funds are provided. The architectural and engineering work on a replacement for the fire-destroyed insect and disease laboratory at New Haven, Connecticut is being completed on an emergency basis so that construction can proceed in fiscal year 1966.

A construction contract for the laboratory at Madison, Wisconsin, funded in fiscal year 1965, is scheduled to be let in early Spring 1965.

Laboratory planning funded in fiscal year 1965 is on schedule.

These facilities are adding substantially to the progress of research underway at these locations as exemplified by Figure S-1.



Forestry Sciences Laboratory, Research Triangle, Durham, North Carolina -- modern facilities for insect physiology research provided by recent construction.



The newly completed Timber and Watershed Laboratory at Parsons, West Virginia provides improved facilities for research on forest land problems of the northern Appalachians.

Figure S-1

(29) Cooperation in forest fire control \$12,783,000

No program increase is proposed for fiscal year 1966.

Protection is essential to the wood, water, forage, wildlife, and recreation resources on the State and private lands of the Nation. These resources play a key role, not only in the national economy, but also as a base for the economic well-being of people and communities in rural America.

The fire situation in 1963 gave dramatic testimony to the inadequacy of fire protection for areas where cooperative forest fire control is authorized by the Clarke-McNary Act of 1924. In 1963, 153,000 fires burned 7 million acres of State and private forest land and non-forest watershed areas; a devastation nearly equal in size to both Connecticut and Massachusetts. The number of fires in 1963 exceeded the previous five-year annual average by over 65%. The area burned was 133% greater. (See Figures T-1 and T-2.)

In a worse than normal fire weather year such as 1963, and it is known that these can be expected at least once each decade, firefighting forces are overwhelmed. It is essential that their capabilities be increased so that such critical situations, whether due to adverse weather or national emergency, can be more adequately dealt with. The Nation cannot afford to sustain these recurrent peak losses--the potential for example of what happened in New Jersey in 1963--the death of 5 people, injury to 257 people, destruction of 237 homes, and 358 other buildings, and the burning of 202,116 acres.

The Food and Agriculture Act of 1962 and the Department's Rural Areas Development program provide the base for moving ahead on a broad front to develop opportunities and solve problems in rural America. Control of fires on forest land and watershed lands is essential to the success of these programs. Rural welfare is closely tied to the watershed, timber, recreation, water, and wildlife resources on private lands. Especially is this true in the economically distressed areas. Failure to provide adequate protection can result in the destruction of these resources.

The cooperative forest fire control program is currently aiding the economy of rural communities by the employment of nearly 100,000 local people in rural areas full or part-time in the various preparedness phases of forest fire control, such as building construction, and use and maintenance of trucks, tractors, telephones, and radios.

Project (29)

Fire control forces adequate to meet critical peacetime fire conditions provide the base for meeting possible wartime emergency rural fire situations.

The calendar year 1963 compilation of data from each State shows a total of 453 million acres in the Clarke-McNary Cooperative Program. In 1957 it was estimated that adequate protection for the area then within the program would cost about \$83.5 million. In fiscal year 1963 total expenditures, Federal, State, and private, were \$65,828,266. Of this total the direct Federal contribution was \$11,632,266. The Clarke-McNary Act authorizes a 50% sharing by Federal funds as an appropriate measure of national interest. From 1954 to 1963 the annual level of State and private expenditures has increased \$23.7 million; during the same period Federal appropriations increased \$3 million. In 1954 the Federal share of costs was 23%; in 1963 it was less than 18%.

More lands need protection. Studies made periodically in each State have as one objective a redetermination of the area which should be included within the Clarke-McNary program. Increasing resource values, especially water resources, have resulted (each time such a study is made) in recognition that additional areas of non-forest watershed lands should be given organized protection. Watershed protection to insure the continued production of regulated flows of high quality water is essential to the growth of the Nation. (See Figure T-3.) These benefits are for the most part "off site"; they do not accrue primarily to the landowner. More than this, they are most commonly "interstate." Disastrous fires on watershed lands in major river headwaters in one State may result in loss of values in a State or States far downstream.

Current resource values, including outdoor recreation, justify higher standards of protection at greater cost than was the case even as recently as 1957. More people are using the woods. This means more fires, but fire protection agencies should not have to resort to excluding the public from use and enjoyment of the woods as a substitute for firefighting forces. Increased costs of doing business are being experienced in fire control as in other activities.

Emphasis will be placed on prevention of man-caused fires in the South. The continuing high level of man-caused fire occurrence in the South poses a threat to the long-range economic and social stability of this important resource area. Only limited progress has been made in solving the problem because incendiarism is a major cause. 1963 saw the second year of adverse trend in the rate of man-caused fire incidence in the southern States. In

that year the number of fires rose to approximately the level experienced ten years ago and accounted for 62% of the total fires on State and private lands in the Nation.

State Foresters have been leaders in the development of the National Cooperative Forest Fire Prevention (Smokey Bear) program. The annual value of the contribution of the Nation's advertisers and media outlets has been estimated at \$15 million in support of this national program. Recently a Regional Cooperative Forest Fire Prevention Campaign has been established for the southern States by the Forest Service and the State Foresters. These two mass media campaigns for fire prevention have been extremely effective and should be expanded. The general public is now more aware of the need and prepared to support a more direct action program. The present challenge is to solve the hard core of the problem at the grass roots level. Cooperating southern States will be encouraged to divert funds and effort from other fire control work to meet this high priority need.

Alaska--a special situation. Alaska will eventually obtain title to more than 100 million acres of public domain and other Federal lands. Fire protection for these lands has in the past been provided through appropriation to the responsible agency; primarily the Bureau of Land Management. In fiscal year 1963 State expenditures for fire protection were \$188,569 to protect the six million acres already placed under State administration. As the transfer program accelerates, the State faces the need to build and finance a supervisory fire control organization and field forces to replace the protection formerly supported by direct appropriation.

Examples of Recent Accomplishments

For the Nation as a whole 1963 was a disastrous fire year. Severe fire weather in the eastern and southern States was a cause of the large increase in the number of fires and area burned.

During 1963 fire protection was brought to 3 million acres of previously unprotected forest land and non-forest watershed areas. That accomplishment resulted in saving over 500,000 acres from burning. This is because unprotected lands burn at a rate of 175 acres per thousand, and protected lands at 7 acres per thousand.

1963 saw the initiation of a study in each State to update information on the area in need of protection and the cost of providing that protection to adequate standards. Each

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State is reviewing its forest fire control needs and determining what is required in manpower, equipment, and physical plant to meet protection objectives.

Twenty-two States benefited from the Public Works Acceleration Act. Besides providing additional employment in local areas, forest fire protection facilities were constructed--in 150 counties and 260 projects. The work included construction of headquarters, warehouses and shops, lookout towers, telephone lines, fire roads, aircraft hangars, etc., to expedite the fire control job.

Following is a table showing the amounts for Cooperative Fire Protection, by States:

	State and Private Funds Expended F. Y. 1963	Federal Allotments F. Y. 1963	Federal Allotments F. Y. 1965	1/
Alabama	\$1,134,546	\$403,400	\$397,500	
Alaska	188,569	47,000	47,000	
Arkansas	1,103,773	349,800	383,300	
California	16,537,366	1,152,300	1,112,000	
Colorado	123,891	47,000	48,200	
Connecticut	311,514	57,500	85,300	
Delaware	15,264	15,500	15,500	
Florida	3,231,441	582,500	573,100	
Georgia	3,035,464	563,200	575,400	
Hawaii	33,065	25,000	35,000	
Idaho	449,556	196,500	206,100	
Illinois	135,888	70,500	68,100	
Indiana	114,825	53,700	52,000	
Iowa	81,328	47,000	47,000	
Kansas	8,908	5,000	47,000	
Kentucky	791,423	226,900	246,400	
Louisiana	1,704,659	460,300	477,100	
Maine	981,953	326,200	330,300	
Maryland	451,061	155,200	149,800	
Massachusetts	387,369	132,800	133,500	
Michigan	1,964,735	485,200	483,500	
Minnesota	751,900	313,800	302,900	
Mississippi	1,868,567	474,200	477,200	
Missouri	823,679	268,900	279,300	
Montana	372,929	142,200	153,400	
Nebraska	15,909	9,000	47,000	
Nevada	250,015	49,400	67,400	
New Hampshire	239,633	88,200	93,000	
New Jersey	503,717	134,800	133,200	
New Mexico	92,371	47,000	47,000	
New York	828,397	300,200	289,700	
North Carolina	1,591,100	421,900	451,900	
North Dakota	9,234	14,000	14,000	
Ohio	322,755	123,100	121,700	
Oklahoma	203,428	174,900	168,800	
Oregon	2,436,856	559,400	544,200	
Pennsylvania	1,159,609	246,300	273,200	
Rhode Island	118,797	47,000	47,000	
South Carolina	1,408,155	391,800	408,000	
South Dakota	65,832	47,000	47,000	
Tennessee	1,158,529	336,800	375,300	
Texas	869,450	350,300	338,100	
Utah	117,491	47,000	47,500	
Vermont	55,545	47,000	47,000	
Virginia	1,155,517	358,300	363,600	
Washington	2,940,095	557,300	553,500	
West Virginia	366,697	161,600	167,200	
Wisconsin	1,641,810	439,100	423,800	
Wyoming	41,385	47,000	47,000	
Administration, Inspection, Prevention and Special Services to States	- -	865,500	941,000	
GRAND TOTALS	54,196,000	12,465,500	12,783,000	

1/ While the amount available to a State may, if the allotment is small, exceed previously computed expenditures by that State, the actual payment to a State never exceeds State and private funds expended by or under the control of the State.



More State and private acreage burned in 1963 than in 1960.

State and Private Lands - Area Burned
1954 - 1963

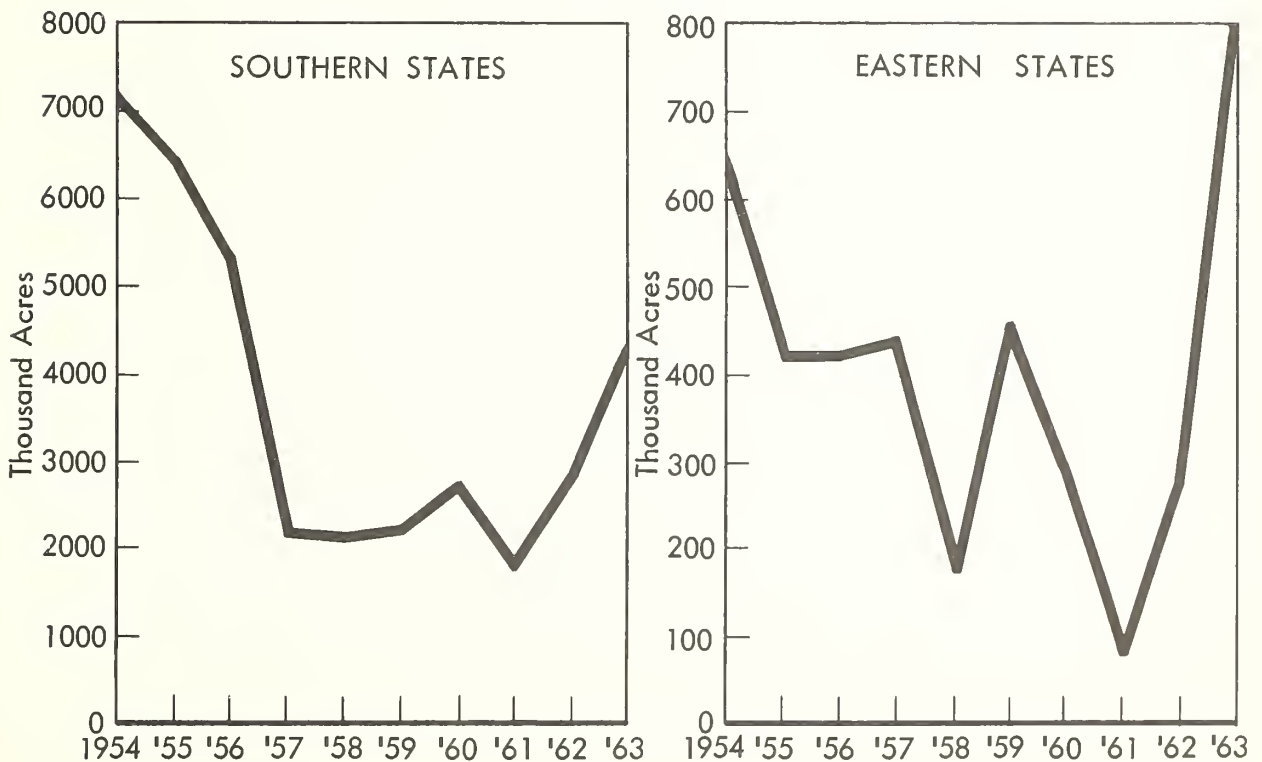
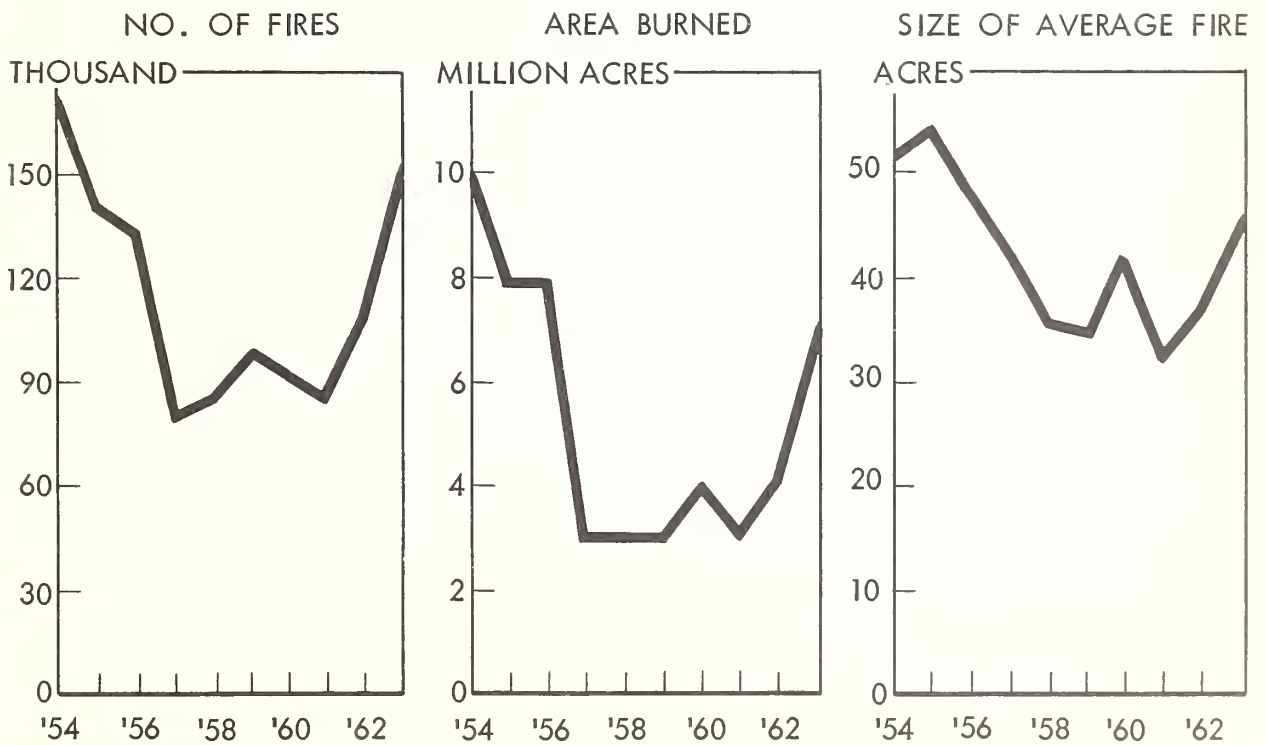


Figure T-1



Woodland Fire Protection is Essential for Rural America



State and Private Lands -- 1954-1963

Figure T-2



These watersheds must be protected.

Figure T-3

(30) Cooperation in forest tree planting \$300,000

No program increase is proposed for fiscal year 1966.

The Forest Service cooperates with the States through financial assistance and technical and other services in the production, acquisition, and distribution of tree planting stock for forest and windbarrier plantings. Current estimates indicate that there are 70 million acres of unproductive lands in private and non-Federal ownerships in need of forestation through planting and seeding. At the current forestation rate, it will take about 70 years to accomplish this forestation. The rate of reforestation needs to be at least doubled or possibly tripled to put this 70 million acres in productive condition to meet the need for a wide variety of uses including timber production, wildlife, watershed, recreation, and special forest products. Federal leadership and financial participation is necessary to restore these unproductive lands to productivity and meet the Nation's timber resource needs and strengthen the basis for stronger local economic stability. Tree planting stock will be needed also to plant land converted from cropland use under the Food and Agricultural Act of 1962 and the Resource Conservation Development and Rural Renewal Programs. The War on Poverty will need trees for planting in impoverished rural counties to provide employment and develop the woodlands in these areas. The 1966 objective is to assist the States in production of 650 million high quality seedlings for distribution to private landowners for reforestation of approximately 1 million acres.

Examples of Recent Accomplishments

The Federal-State cooperation in the production and distribution of forest and shelterbelt planting stock, for use on non-Federal land, continues at about the 1963 level. Forty-eight States and Puerto Rico continued to cooperate in this program. They operate 99 nurseries that produced an estimated 610 million trees for forestation and shelterbelt planting in 1964. (See Figure T-4.)

Special technical and financial help was provided a few States in designing and constructing modern forest tree seed extractories and storage facilities. These new plants provide seed facilities that are necessary for efficient nursery operations.

The usual technical and financial assistance was continued. Emphasis was on helping with such technical problems as seeding, soil management, chemical weed control, insect and disease control, grading and packaging the planting stock, handling stock while enroute to the planting site. Improvements in nursery techniques along with better

Project (30)

field planting practices are resulting in better survival, more rapid growth, and reduced costs for establishing a stand of forest trees or shelterbelts. Some States are successfully assisting landowners with direct seeding where research has developed such practical reforestation methods.

The number of trees shipped to landowners during each of the past five fiscal years in comparison with all forest and shelterbelt trees produced by public and private nurseries is as follows:

<u>Year</u>	<u>Federal-State Cooperative Program</u>	<u>Other State Distribution</u>	<u>Total Output All Nurseries</u>
1960	844,599,000	522,830,000	1,918,746,000
1961	744,159,000	248,186,000	1,537,558,000
1962	670,000,000	28,000,000	1,100,000,000
1963	587,647,000	30,607,000	1,008,000,000
1964	535,429,000	43,174,000	948,312,000



Modern and efficient State forest tree nurseries are providing private land owners with high quality planting stock at low-costs. In addition, the States furnish technical assistance in the form of written guides and instructions and on-the-ground help with reforestation problems.



Scientific tree breeding and propagation are giving great promise to improved quality, more rapid growth, resistance to insects and diseases. This 4-year-old hybrid pine tree is an example of trees now being tested under natural conditions.



Figure T - 4

(31) Cooperation in forest management and processing .. \$3,527,000

An increase of \$500,000 would be used to improve the present and the future income opportunities of the owners of the Nation's small private woodlands, loggers, operators of small sawmills and plants processing primary forest products, and many others whose livelihood is dependent upon the multiple use management of these woodlands. At the same time it would help to strengthen the resource base for the Nation's forest products and services industries future needs.

There are 4.5 million small woodland ownerships. They own 265 million acres or 53% of the Nation's commercial forest land, and produce about half of its forest products. If this large acreage of forest land is to make its full contribution to the income of its owners and to the needed increase in employment and development in the rural areas, skillful application of sound multiple use forestry practices is necessary. (See Figure T-6.) Few woodland owners are aware of the opportunities or have the necessary technical skills to profitably manage forest lands for their many alternative uses, or to market timber and special forest products. Conservative estimates indicate that 500,000 of these owners should be receiving technical help each year in managing their forest lands for timber, water, wildlife, forage, recreation, and other uses. Many of the loggers harvesting products from these lands need help in improving their techniques, and many of the 50,000 operators of small sawmills and processing plants depending on forest produced raw materials need help in finding adequate markets and improving their manufacturing skills and techniques to meet market requirements. The Forest Service, therefore, cooperates with 49 States and Puerto Rico in this program. Under it, State-employed service foresters work directly with landowners and processors in their woodlands and at their plants. (See Figure T-5.)

An appropriation of \$3,527,000 is needed for the fiscal year 1966. When matched with State funds, this will make it possible to provide assistance to 154,000 woodland owners and 13,700 processors.

Project (31)

Examples of Recent Accomplishments

The following tabulation shows the estimated accomplishments in Cooperative Forest Management and Processing for fiscal year 1964:

Activity	Unit	Accomplishment
Owners given woodland management assistance	Number	97,063
Forest products operators assisted	Number	8,691
Area receiving management assistance	Acres	6,140,678
Timber products sold or harvested	MBF <u>a/</u>	668,274
Value of timber products sold or harvested	Dollars	15,582,231
Young timber saved from premature harvest	Acres	191,980
Owners referred to consulting foresters and industrial foresters for additional assistance	Number	2,173
Area involved in above referral ..	Acres	682,164

a/ Thousand board feet

Forty-nine States and Puerto Rico participate in this program. In fiscal year 1964 the States contributed an estimated \$4,402,895 and the Federal Government provided an estimated \$2,273,278. During this period only about 2.1% of the Nation's woodland owners were assisted by the 732 available "service" or farm foresters.

In addition to better management for timber production, increased emphasis is being placed on the management of other forest resources for multiple uses such as recreation, grazing, water, and special forest products.

COOPERATIVE FOREST MANAGEMENT



With the guidance of the service forester this family has planned and planted a future timber crop.

More than one product is harvested from this well-managed woodland. Naval stores and timber provide this owner with a continuing income.



A Service forester helped the owner of this woodland to carefully select trees for harvest and to leave the stand well-stocked with desirable trees for future returns.

Figure T-5



With improved multiple use management of private woodlands, owners and communities can obtain increased income from several sources. Examples are recreation, and special products such as maple syrup and Christmas trees.

Figure T-6

(32) General forestry assistance \$903,000

No program increase is proposed for fiscal year 1966.

The Forest Service provides specialized technical services to improve timber harvesting, processing and utilization techniques, and to expand the markets for forest products in support of Rural Areas Development. The results of these services help improve economic conditions and the utilization of manpower in economically distressed rural areas.

Specialists in utilization and marketing provide on-the-ground services to forest landowners, loggers, and processors of forest products and maintain close working relationships with experiment stations and forest products laboratories, Federal, State, and private.

Funds are used to a limited extent to reimburse State Foresters' organizations for special Rural Areas Development activities and for employment of utilization and marketing specialists to provide special services in particular areas at request of Forest Service.

Utilization and marketing specialists provide assistance to landowners, loggers, and processors of forest products for the purpose of improving logging, manufacturing and utilization techniques and to expand markets for forest products. Special forest products, as well as timber products, are included. Assistance consists of services in handling, processing, and marketing requiring a broad State and Regional knowledge of resource availability and market potentials. (See Figure T-7.)

They provide information needed by forest industries regarding availability of raw materials, industrial sites, transportation routings, labor supplies, and outlets for manufactured or partially manufactured products.

General forestry assistance also provides specialized technical assistance to State forestry organizations, universities, industrial and consulting foresters, private owners of large forest properties, and to other Federal forest property owners. It performs forest management work in the Virgin Islands and cooperates with defense agencies to provide emergency supplies of timber and other forest products. It provides for services to Rural Areas Development Committees and other local economic development groups.

Project (32)

The appropriation of \$903,000 needed for the fiscal year of 1966 will make it possible to give technical assistance to landowners, loggers and processors, of forest products; to serve State and local rural areas development groups and to bring about improved forest management on millions of acres of large private ownerships and forest lands under the administration of State and Federal agencies.

Examples of Recent Accomplishments

In fiscal year 1964 General Forestry Assistance work in all States was increased to assist Rural Areas Development groups in evaluating their forest resource capabilities and in planning and carrying out programs to develop and use these resources for improving rural employment opportunities and income. A majority of the low-income counties designated in accordance with the Area Redevelopment Act are more than 50% forested.

At the same time highly specialized technical assistance in forest management and timber processing and marketing, not available through other programs, continued to be given to State forestry agencies, Federal managers of forest lands, universities and schools, industrial and consulting foresters, private owners of large forest properties and to processors of forest products. Work was continued in cooperation with defense agencies in planning for emergency timber supplies.

Forestry management, utilization and marketing work in the Virgin Islands was continued to help the people there make the best use of their forest resource development and use opportunities.

GENERAL FORESTS GENERAL FORESTRY ASSISTANCE



Commercial thinning is the beginning of a long chain of income producing action that extends from the well-managed farm woodland to the finished product. This pulpwood will become paper, or container board, or fiber board for building.



The raw materials harvested from private woodlands create more jobs and income when they reach the processing plant. Here match bolts and sawlogs will go through the primary operation that will lead to still more processes and more jobs.

Figure T-7

DEVELOPMENT PROGRAM FOR THE NATIONAL FORESTS

Cumulative Fiscal Years 1963, 1964 and 1965 1/
(In thousands of dollars)

	1963-1965:	1963-1965 Available			
	Planned	Forest Service:	Public	Difference:	Percent
	Level	Appropriation	Works	Total	Financed
FOREST MANAGEMENT:					
National Forest Protection and Management:					
Timber resource management:					
(a) Sales administration and management ..	83,576:	82,610:	-	82,610:	98.8
(b) Reforestation and stand improvement ..	80,608:	47,967:	5,294:	53,261:	66.1
Recreation-public use	130,343:	75,705:	10,611:	86,316:	66.2
Wildlife habitat management	14,232:	10,775:	1,637:	12,412:	87.2
Range resource management:					
(a) Management	16,106:	15,118:	-	15,118:	93.9
(b) Revegetation	8,767:	8,180:	46:	8,226:	93.8
(c) Improvements	11,760:	9,809:	1,986:	11,795:	100.3
Soil and water management	23,555:	15,123:	1,206:	16,329:	69.3
Mineral claims, leases, and special uses ..	12,507:	11,273:	-	11,273:	90.1
Land classification, adjustments, and surveys					
Forest fire protection	16,648:	11,569:	-	11,569:	69.5
Structural improvements for fire and general purposes (construction and maintenance)	80,080:	68,380:	1,187:	69,567:	86.9
Total, National Forest Protection and Management	43,972:	33,899:	16,715:	50,614:	115.1
Insect and Disease Control:					
White pine blister rust control	522,154:	390,403:	38,682:	429,085:	82.2
Other pest control	11,712:	10,697:	51:	10,748:	91.8
Total, Insect and Disease Control 2/	20,788:	24,401:	146:	24,547:	118.1
Acquisition of Lands, Weeks and Special Acts ..	32,500:	35,098:	197:	35,295:	108.6
Forest Roads and Trails (including all related appropriations)(obligating authority)	12,530:	4,712:	-	4,712:	37.6
TOTALS	297,742:	223,472:	18,719:	242,191:	81.3
	864,926:	653,690:	57,598:	711,288:	82.2

1/ Excludes fiscal years 1964-1965 supplemental appropriations and obligating authority for Alaska earthquake damages: Montana and Idaho flood damages. Includes 1965 Pay Act supplemental.

2/ Includes \$7,000,000 for lands not administered by the Forest Service.

Change in Language

Changes in the language of this item are proposed as follows. (New language is underscored, and deleted matter is enclosed in brackets):

For expenses necessary for forest protection and utilization, as follows:
Forest land management: For necessary expenses of the Forest Service, not otherwise provided for, * * * Provided, That not more than \$680,000 of this appropriation may be used for acquisition of land under the Act of March 1, 1911, as amended (16 U.S.C. 513-519) * * * .

[For an additional amount for "Forest protection and utilization", for Forest research, \$1,900,000, of which \$50,000 for Forest research construction shall remain available until expended.]

[For an additional amount for "Forest protection and utilization", for "Forest land management", \$800,000.]

The first would make it clear that only moneys appropriated for Weeks Act acquisition under this appropriation item are limited and that the limitation would not apply to acquisition with any funds made available under the Land and Water Conservation Fund Act, enacted on September 3, 1964, even though such lands are purchased under the Weeks Act authority.

The second change would delete supplemental appropriation language included in the 1965 Department of Agriculture and Related Agencies Appropriation Act which provided funds for pesticide research.

The third change would delete language included in the Supplemental Appropriation Act, 1965, which provided funds for repair of flood damage to Forest Service improvements in Montana and Idaho.

(b) Forest Roads and Trails

Appropriation Act, 1965	\$70,300,000
Proposed supplemental, 1965, for increased pay costs	<u>1,172,000</u>
Base for 1966	71,472,000
Budget Estimate, 1966	<u>78,672,000</u>
Increase	<u>+7,200,000</u>

This appropriation provides for the liquidation of obligations incurred for the construction and maintenance of forest roads and trails (and the purchase of access roads) pursuant to the authorization contained in the Federal Highway Act of 1964. An appropriation of \$78,672,000 for 1966 will provide sufficient cash to liquidate prior year obligations and obligations planned for fiscal year 1966 which must be paid by June 30, 1966.

Authorizations for Appropriations^{a/}

<u>Fiscal</u> <u>Year</u>	<u>Construction</u>	<u>Maintenance</u>	<u>Total</u>	<u>Funded</u>	<u>Unfunded</u>
1964	\$56,300,000	\$13,700,000	\$70,000,000	\$70,000,000	- -
1965	66,800,000	18,200,000	85,000,000	48,508,000 ^{b/}	\$36,492,000 ^{c/}
1966	<u>69,800,000</u>	<u>15,200,000</u>	<u>85,000,000</u>	<u>78,672,000</u>	<u>6,328,000^{d/}</u>
Total	192,900,000	47,100,000	240,000,000	197,180,000	42,820,000

^{a/} The annual appropriation language and the Department presentation combine the appropriation for "Forest Roads and Trails" made pursuant to 23 USC 205 and the appropriation of ten percent of forest receipts for construction and maintenance of roads and trails pursuant to 16 USC 501. This merger of funds is made in order to simplify the programing, allotment, and accounting of funds at the field level. Since the accounts for these two funds are merged it is not practicable to distribute obligations and expenditures between the two appropriations on a precise basis. The amounts shown for the "Forest Roads and Trails" appropriation are a proration based on the percentage that contract authorization used under the appropriated funds is of total available funds. Expenditure amounts for maintenance are based on all such obligations requiring cash payment during the fiscal year.

^{b/} The 1965 appropriation of \$70,300,000 and the proposed Pay Act supplemental of \$1,172,000, less prior year unfunded authorization of \$22,964,000, provide \$48,508,000 for funding of the \$85,000,000 authorization for 1965.

^{c/} Includes \$5,215,000 which has been administratively reserved.

^{d/} Includes \$4,000,000 which has been administratively reserved.

Status of Unfunded Authorizations

Unfunded contract authorizations beginning of 1965	\$107,964,000	
Appropriation, 1965	-70,300,000	
New contract authorization, 1965 (1966 authorization available in 1965--Federal-Aid Highway Act)	85,000,000	
1965 proposed supplemental for increased pay costs	-1,172,000	
Total unfunded beginning of 1966	121,492,000	a/
1966 Budget Estimate (cash requirements)	-78,672,000	
New contract authorization, 1966 (1967 authorization available in 1966--Federal-Aid Highway Act).....	85,000,000	
Balance to remain unfunded as of June 30, 1966	127,820,000	a/

a/ At the present time \$8,450,000 of the available fiscal year 1965 authority has not been administratively approved for obligation. The fiscal year 1966 budget proposes utilization in 1965 of \$3,235,000 of this unused 1965 authorization, leaving \$5,215,000 in administrative reserve. In addition, \$4,000,000 of the fiscal year 1966 authority has been administratively reserved.

Analysis of Cash Requirements

1. Unliquidated obligations June 30, 1964	\$31,219,208	
2. Estimated cash requirements to finance 1965 program	53,688,429	a/
3. Total cash requirements by June 30, 1965	84,907,637	
4. Less cash on hand 1965:		
Balance from 1964	\$13,435,637	
Appropriated 1965	70,300,000	
	83,735,637	
5. Additional cash needed for 1965 obligations (Supplementals to be proposed later in year)	1,172,000	
6. Obligations in 1965 for which cash was not provided in item 2	28,042,000	
7. Estimated cash required to finance 1966 program	50,630,000	b/
8. Total cash required for 1966	78,672,000	

a/ An estimated 70% of the \$72,500,000 new obligations, 90% of \$7,000,000 Montana-Idaho flood damages and Alaska earthquake damages, and Pay Act Costs (P.L. 88-426) of \$1,500,000 will require cash payments during the fiscal year.

b/ An estimated 60% of \$84,235,000 new obligations will require cash payments during the fiscal year.

PROJECT STATEMENT

The following tabulation reflects the total program for the construction and maintenance of roads and trails on the National Forests by combining the funds available under the appropriation "Forest Roads and Trails" with the permanent appropriation of 10 percent of National Forest receipts. This permanent appropriation for Roads and Trails for States (10 Percent Fund) is estimated at \$13,400,000 for 1966 compared with \$13,141,263 for 1965, an increase of \$258,737.

Project	1964	1965 :(estimated)	Increase or Decrease	1966 :(estimated)
1. Construction of roads and trails	\$61,060,009	\$73,686,693	+\$6,248,307	\$79,935,000
2. Maintenance of roads and trails	16,221,840	21,185,000	+3,485,000	17,700,000
Total obligations	77,281,849	94,871,693	+2,763,307	97,635,000
Transfer from "Roads and Trails for States"	-12,000,882	-13,141,263	-258,737	-13,400,000
Program under "Forest Roads and Trails" contract authorization	65,280,967	81,730,430	+2,504,570	84,235,000
Obligations incurred under unfunded contract authorization	-2,080,967	-10,258,430	+4,695,430	-5,563,000
Total increased pay costs (P.L. 88-426)	(- -)	(1,500,000)	(+35,000)	(1,535,000)
Total available or estimate	63,200,000	71,472,000	+7,200,000	78,672,000

An increase of \$7,200,000 is needed to meet cash requirements for liquidation of contract authorization. This appropriation provides for the liquidation of obligations incurred for the construction and maintenance of forest roads and trails pursuant to the authorization contained in the Federal-Aid Highway Act. An appropriation of \$78,672,000 for 1966 is required to:

- (1) Pay for obligations of the prior year which will be due for payment in fiscal year 1966, and
- (2) Pay the portion of 1966 obligations of \$84,235,000 contract authorization which will require cash payment in that year. This includes \$81 million of the 1966 authority plus \$1.7 million of unused 1965 authority which is needed to complete the restoration of trails damaged by the June 1964 floods in Montana and Idaho, plus \$1,535,000 of unused 1965 authority for Pay Act costs (P.L. 88-426).

The increase would partially meet the most critical needs for roads and trails required to open up timber for sale, for making recreation areas accessible, for faster attack on fires, and for meeting other transportation requirements in the multiple use management and protection of the National Forests.

The level of financing assumes continued contributions to the road system by timber operators under timber sale contracts. The more important operator-built road will be designed and supervised with funds provided under this appropriation. Also some supplementation of operator construction will be done to obtain the required standard of roads for future timber sale in the area. (Under current authority, the timber operators can only be required to build a road to a standard which is considered prudent for the sale in question.)

In addition to road construction itself, funds are included for the purchase of roads now owned by others. These roads are needed to provide access to National Forest timber as well as other uses.

The requested funds will also provide for maintenance of National Forest road and trail systems. This degree of Forest Service responsibility for this system is shown in the following table:

	<u>Roads</u> (Approximate Mileage)	<u>Trails</u> (Approximate Mileage)
Maintenance by Forest Service	103,908	101,360
Maintenance by Others	<u>89,955</u>	<u>3,296</u>
Total	193,863	104,656

This National Forest road transportation system and its extension is highly important in maintaining and increasing rural industries dependent on forest resources. It is vitally essential to the small timber operator since it permits smaller sales which he can handle. It is essential to the many small businesses which depend on tourism for a livelihood. It is also essential for effective forest protection from fire, insects, and disease and for the salvage of timber felled by blowdown, fire, insects, or disease.

Following is a summary of the major road construction proposed for 1966:

	<u>Units</u>	<u>Estimated Cost</u>
Bridges	213	\$ 4,950,000
Roads	1,865 miles	45,541,000
Trails	900 miles	3,000,000
Surveys, Plans, and Supervision of Timber-Purchaser Roads	5,000 miles	20,094,000
Supplementing Timber Purchaser Construction	979 miles	4,250,000
Road Purchase		2,000,000

Examples of Recent Accomplishments

Under this program, the existing system of roads and trails used for the protection and multiple use management of the National Forests is maintained and improved and additional facilities are constructed as needed to develop the forests and obtain the maximum practicable yield and use of their resources on a continuing basis. An adequate and complete system of roads and trails is essential. (See Figures U-1 and U-2.) During the ten-year period 1963-1972, 46,400 miles of roads and 8,000 miles of trails should be built by the Forest Service to meet forest management, protection, development, and utilization needs. Even with the estimated 1,300 miles of road construction derived from the Accelerated Public Works financing, construction financing during the period 1963-1965 will be only about 16% of that needed for the ten-year period.

In the spring of 1964 Alaska areas sustained considerable earthquake damage and Montana and Idaho areas suffered severe flood damage. Additional contract authorization of \$50,000 in 1964 and \$300,000 in 1965 was obtained to repair damaged roads and trails in Alaska.

The June floods in Idaho and Montana caused an estimated \$8,900,000 damage to forest roads and trails. (See Figure U-2.) Reliable sources indicate this flood was of a greater intensity than that predicted for a 100-year interval. Additional contract authority of \$500,000 in 1964 and \$6.7 million in 1965 was obtained to provide for emergency repair of these road and trail facilities. An additional \$1,700,000 contract authorization is being requested for 1966, primarily to complete trail damage repair. Over 425 miles of road, 55 bridges, and 750 miles of trail in Montana and Idaho were damaged or destroyed by these storms and resulting floods.

The transportation system is maintained in part by State and local authorities, licensees, permittees, and purchasers of Federal timber and other forest products.

During fiscal year 1964, \$16,222,000 was obligated for repair of flood damage, maintenance and preservation of existing roads and trails and \$61,060,000 for road, trail, and bridge construction and reconstruction. In addition, purchasers of Government timber accomplished road maintenance representing an estimated expenditure of \$6,090,000 and started construction on roads estimated to cost \$50,973,000.

Construction started in fiscal year 1964 was:

	By the Government	By Purchasers of Timber	By APW Funds
Roads (miles)	1,524	4,237	617
Trails (miles)	525	- -	128
Bridges (number)	214	43	38



Multiple use road of ample capacity for all travelers.



Permanent type bridge structures are being constructed to replace temporary bridges.

Figure U-1



Preparing to oil campground road to prevent dust nuisance.



Montana Storm damage to mountain roads caused by excessive surface water run off.

Figure U-2

(c) Access Roads

PROJECT STATEMENT

Project	1964	1965 (estimated)	1966 (estimated)
Access roads	\$273,803	\$847,440	- -
Unobligated balance brought forward	-1,121,243	-847,440	- -
Unobligated balance carried forward	847,440	- -	- -
Total Available or Estimate	- -	- -	- -

The unobligated balance of \$847,440 from the fiscal year 1962 appropriation will be fully obligated during fiscal year 1965. During fiscal year 1964, 14 cases were obtained involving 73 miles of new land easements or rights-of-way over existing roads or interests in existing roads. An estimated 200 miles will be obtained in fiscal year 1965.

Effective with fiscal year 1964, this appropriation was eliminated and future access road purchase, beyond that to be accomplished with the balance remaining in this appropriation, will be accomplished under the Forest Road and Trail appropriation.

(d) Acquisition of Lands for National Forests, Special Acts

Appropriation Act, 1965 and base for 1966	\$70,000
Budget Estimate, 1966	<u>70,000</u>

PROJECT STATEMENT

Project	1964	1965 (estimated)	1966 (estimated)
1. Cache National Forest, Utah	\$10,000	\$10,000	\$10,000
2. Uinta and Wasatch National.. Forests, Utah	17,001	20,000	20,000
3. Toiyabe National Forest, Nevada	--	8,000	8,000
4. Angeles National Forest, California	3,038	8,000	--
5. Cleveland National Forest, San Diego County (California)	8,000	8,000	--
6. San Bernardino-Cleveland National Forests (River- side County), (Calif.) ...	8,000	8,000	--
7. Sequoia National Forest, California	278	8,000	32,000
Unobligated balance reverted to National Forests Fund	23,683	--	--
Total increased pay costs (P.L. 88-426)	(--)	(230)	(230)
Total available or estimate	<u>70,000</u>	<u>70,000</u>	<u>70,000</u>

The Congress has enacted several special laws which authorize appropriation from the receipts of certain specified National Forests for the purchase of lands to minimize erosion and flood damage. Appropriations under seven of these special acts for 1965 are:

Forest and Act

Cache (Utah), Act of May 11, 1938, as amended	\$10,000
Uinta-Wasatch (Utah), Act of August 26, 1935, as amended	20,000
Toiyabe (Nevada), Act of June 25, 1938, as amended	8,000
Angeles (California), Act of June 11, 1940	8,000
Cleveland, San Diego County (Calif.), Act of June 11, 1940	8,000
San Bernardino-Cleveland, Riverside County (Calif.), Act of June 15, 1938, as amended	8,000
Sequoia (California), Act of June 17, 1940	<u>8,000</u>
Total	<u>70,000</u>

There are critical watershed lands needing soil stabilization and vegetative cover restoration to prevent serious erosion and damaging floods within these National Forests. Land treatment measures must be applied and subsequently maintained on all lands in these areas to make corrective action fully effective. To assure full program effectiveness the intermingled private lands must be acquired by the Federal Government.

The fiscal year 1966 budget is at the same level as fiscal year 1965 for those National Forests in Utah and Nevada. However, the \$32,000 provided in fiscal year 1965 for four California National Forests (\$8,000 to each) is programed in the fiscal year 1966 budget to one National Forest -- the Sequoia. This will provide the opportunity to acquire individual properties having higher values than the \$8,000 provided for that forest in fiscal year 1965.

During fiscal year 1964, 10,178 acres of land were purchased under the special purchase authorities applying to the Cache, Uinta and Wasatch National Forests in Utah. Figures V-1 and V-2 show examples of areas where such purchases are being made so that flood prevention and erosion control measures can be applied.

In this same period, 138 acres of land were purchased in the National Forests of southern California under special laws enacted in 1938 and 1940. These acquisitions help to protect steep, critically valuable watersheds lying immediately above heavily-populated urban areas.

Cache National Forest. In fiscal year 1964 funds were available from two sources for purchase of lands within the Cache National Forest in Utah.

1. The Receipts Act of May 11, 1938, as amended--\$10,000. This is an annual appropriation.
2. The Act of July 24, 1956--\$200,000 appropriated under this authority in fiscal years 1957 through 1960. These funds remain available until expended. Through fiscal year 1964, \$173,592 has been obligated from this appropriation.

These funds are used to acquire key tracts of lands in the steep, rough and highly important watershed areas lying north of the Ogden River, along the Wasatch front, and on Wellesville Mountain of the Cache National Forest. These are rugged mountain lands above the river valley which have been damaged and their watershed functions impaired through forest fires or over-grazing. This contributes to excessive rainfall runoff causing severe erosion. The damaged watershed lands are potential sources of floods and mudrock flows. Many tracts of land are located in the north fork of Ogden River and on the drainage of Pineview Reservoir, a Federal reclamation project. Others are within the watersheds of the City of Ogden and the other small towns along the Wasatch front. Public ownership of these lands and the subsequent restoration and protection of their vegetative cover is a highly important part of a vigorous cooperative program with the local community and agencies.

The 1956 Act requires that expenditures of Federal funds be matched by contributions by local agencies or people. This requirement has been met through donations of lands valued at \$185,000. Additional contributions are expected in fiscal year 1965.

The appropriation of \$10,000 under the Act of May 11, 1938 is from receipts of the Cache National Forest. In the absence of this appropriation, the local counties would receive 25% of these receipts for roads and school purposes. Therefore, the local counties, in effect, are contributing one-fourth of the amount of this appropriation. These appropriations are extremely important to the continuation of a vital and worthwhile program extending over twenty years and shared in by both the local agencies and the Federal Government through the National Forests.

Through fiscal year 1964, 28,891 acres have been approved for purchase pursuant to the Receipts Act of 1938, and 14,801 acres under the Special Act of 1956. The 1965 objective is to acquire 1,800 additional acres of these critical watershed lands.

Uinta-Wasatch. In fiscal years 1963 through 1965 an appropriation of \$30,000 was made under the Uinta-Wasatch Receipts Act of August 26, 1935 for acquiring critical watershed lands in the American Fork Canyon watershed. A total of 1,198 acres has been approved for purchase through fiscal year 1964 and an estimated 700 acres will be acquired during 1965. It is estimated that it will take from four to five years to complete the necessary American Fork acquisitions.

Toiyabe, Angeles, Cleveland, San Bernardino, and Sequoia National Forests. In fiscal year 1965, \$8,000 was appropriated under each of these special acts to begin a program of acquiring critical watershed lands in these National Forests. It is estimated that approximately 600 acres will be purchased during 1965.

Changes in Language

Changes in the language of this item are proposed as follows. New language is underscored. Deleted matter is enclosed in brackets.

"For acquisition of land to facilitate the control of soil erosion and flood damage originating within the exterior boundaries of the following national forests, in accordance with the provisions of the following Acts, authorizing annual appropriations of forest receipts for such purposes, and in not to exceed the following amounts from such receipts, Cache National Forest, Utah, Act of May 11, 1938 (52 Stat. 347), as amended, \$10,000; Uinta and Wasatch National Forests, Utah, Act of August 26, 1935 (49 Stat. 866), as amended, \$20,000; Toiyabe National Forest, Nevada, Act of June 25, 1938 (52 Stat. 1205), as amended, \$8,000; [Angeles National Forest, California, Act of June 11, 1940 (54 Stat. 299), \$8,000; Cleveland National Forest in San Diego County, California, Act of June 11, 1940 (54 Stat 297-298), \$8,000; San Bernardino

and Cleveland National Forests in Riverside County, California, Act of June 15, 1938 (52 Stat. 699), \$8,000;] Sequoia National Forest, California, Act of June 17, 1940 (54 Stat. 402), [~~\$8,000~~] \$32,000; in all, \$70,000: Provided, That no part of this appropriation shall be used for acquisition of any land which is not within the boundaries of the national forest and/or for the acquisition of any land without the approval of the local government concerned."

The proposed change deletes language authorizing appropriations for the Angeles National Forest, California; the Cleveland National Forest in San Diego County, California; and the San Bernardino and Cleveland National Forests in Riverside County, California.

The 1966 budget proposes the same fund level as 1965 for National Forest acquisitions in Utah and Nevada; however, funds for the four California National Forests are programed for the Sequoia National Forest, California, in 1966. It is desirable to concentrate the purchase program in California on one forest in 1966 rather than spread it to several.

ACQUISITION OF LANDS, SPECIAL ACTS



If gully systems such as this (in the Mary Ellen drainage American Fork Canyon, Utah) are allowed to develop uncontrolled, resultant floods become progressively more damaging.



Closeup of the main gully in the picture above. The area tributary to this gully is less than one-third covered with plants or litter and requires prompt management effort to bring about its recovery.

Figure V-1

ACQUISITION OF LANDS, SPECIAL ACTS



Graphic example of damage to improvements and fertile farmlands which result from the unimpeded flow of mud and rock out of a steep canyon watershed (near Ogden, Utah).



A closeup view of the above mud-and-rock flow . The flow spread out in the foreground and stopped at the irrigation canal visible beyond the road .

Figure V-2

(e) Acquisition of Lands for Wasatch National Forest

Appropriation, 1965, and base for 1966	\$150,000
Budget Estimate, 1966	- -
Decrease	<u>-150,000</u>

PROJECT STATEMENT

Project	: 1964	: 1965	: Decrease	: 1966
		:(estimated):		:(estimated)
Acquisition of lands for	:	:	:	:
Wasatch National Forest	:\$179,686:	\$220,314	:\$-220,314:	- -
Unobligated balance brought	:	:	:	:
forward	- -:	-70,314	70,314:	- -
Unobligated balance carried	:	:	:	:
forward	70,314:	- -	- -:	- -
Total available or estimate ...	: 250,000:	150,000	: -150,000:	- -

The Act of September 14, 1962 (Public Law 87-661) provided authorization for the appropriation of \$400,000 for purchase of privately owned lands within the Wasatch National Forest in Utah. The full amount of this authorization has been appropriated with the funds remaining available until expended.

The purchase of 7,974 acres of land was approved in 1964. It is expected that most of the remaining 11,000 acres will be acquired in 1965.

Change in Language

The estimates propose deletion of language for this item as follows:

[Acquisition of Lands for Wasatch National Forest]

[For the acquisition of land in the Wasatch National Forest, Utah, in accordance with the Act of September 14, 1962 (76 Stat. 545-546), \$150,000, to remain available until expended.]

This language change deletes the appropriation in its entirety since the authorization of \$400,000 has been fully appropriated, and no estimate for this item is proposed in the 1966 budget.

(f) Acquisition of Lands for Superior National Forest

PROJECT STATEMENT

Project	1964	1965 :(estimated):	1966 :(estimated)
Acquisition of lands for			
Superior National Forest	\$602,478	\$539,216	- -
Unobligated balance brought forward	-1,141,694	-539,216	- -
Unobligated balance carried forward	539,216	- -	- -
Total increased pay costs			
(P.L. 88-426)	(- -)	(900)	(- -)
Total available or estimate	- -	- -	- -

The Act of June 22, 1948 (Public Law 80-733) as amended, provided authorization for the appropriation of \$4.5 million for the purchase of lands and improvements thereon in the Boundary Waters Canoe Area, Superior National Forest, Minnesota. The full amount of this authorization has been appropriated with the funds remaining available until expended.

The legislation authorized and directed the Secretary of Agriculture to acquire any properties which in his opinion should be in Federal ownership in order to restore and preserve the wilderness character of the remaining canoe country along the Canadian boundary in Minnesota. Actions remain to be taken to vest title in the United States for approximately 9,800 acres of privately owned lands involving 18 owners. Approximately 90 percent is planned to be acquired by exchange. Present plans are to complete this acquisition program by June 30, 1965.

(g) Acquisition of Lands for Cache National Forest

PROJECT STATEMENT

Project	: 1964	: 1965	: 1966
	:	:(estimated):	:(estimated)
Acquisition of lands for Cache	:	:	:
National Forest	: \$24,696	: \$26,408	: - -
Unobligated balance brought forward	: -51,105	: -26,408	: - -
Unobligated balance carried forward	: 26,408	: - -	: - -
Total available or estimate	: - -	: - -	: - -

The 1956 Appropriation Act provided \$200,000 for the acquisition of lands in the Cache National Forest pursuant to the Act of July 24, 1956 (70 Stat. 632). Obligations under this fund are in addition to the \$10,000 appropriation from National Forest receipts authorized by the Act of May 11, 1938 and provided in the appropriation, "Acquisition of Lands for National Forests, Special Acts." Under the 1956 Act, funds appropriated must be matched by contribution of funds or land by local agencies or persons. Explanation of this program is included within the Status of Program for "Special Acts."

(h) Cooperative Range Improvements

Appropriation Act, 1965 and base for 1966	\$700,000
Budget Estimate, 1966	<u>700,000</u>

Part of the grazing fees from the National Forests, when appropriated, are used to protect or improve the productivity of the range, mainly by construction and maintenance of fences, stock-watering facilities, bridges, corrals and driveways. These funds are advanced to and merged with the appropriation "Forest protection and utilization," subappropriation "Forest land management."

FORMULA FOR APPROPRIATION

Section 12 of the Act of April 24, 1950 (Granger-Thye Act) provides that of the moneys received from grazing fees by the Treasury from each National Forest during each fiscal year there shall be available at the end thereof when appropriated by Congress an amount equivalent to 2 cents per animal month for sheep and goats and 10 cents per animal month for other kinds of livestock under permit on such National Forest during the calendar year in which the fiscal year begins.

The appropriation for this item since fiscal year 1951 has been \$700,000 except for fiscal years 1954 and 1955 when \$531,000 and \$400,000 were appropriated. Since the actual use figures are not available until after more than one-half of the fiscal year for which funds are appropriated has elapsed, the 1965 appropriation request of \$700,000 necessarily represents the best current approximation of the amount which will become available in the calendar year 1965 under the animal-months-of-use formula.

For calendar year 1963, the latest available figures, use amounted to 5,449,148 animal months for cattle and horses; 6,055,864 animal months for sheep and goats; and 436 for swine. This use under the 2 cents and 10 cents formula calculated to \$666,076.

(i) Assistance to States for Tree Planting

Appropriation Act, 1965 and base for 1966	\$1,000,000
Budget Estimate, 1966	<u>1,000,000</u>

PROJECT STATEMENT

Project	1964	1965 (estimated)	1966 (estimated)
Tree planting assistance	\$997,730	\$1,017,634	\$1,000,000
Unobligated balance brought forward :	-15,364	-17,634	- -
Unobligated balance carried forward :	17,634	- -	-- -
Total increased pay costs :			
(P.L. 88-426)	(- -)	(5,550)	(5,550)
Total available or estimate	<u>1,000,000</u>	<u>1,000,000</u>	<u>1,000,000</u>

This program helps provide for the Nation's expanding future needs for industrial wood through financial and technical assistance to the States in carrying out a Federal-State cost sharing program of planting, seeding, or other forestation work on non-stocked or under-stocked non-Federal commercial forest land. In fiscal year 1965 about 100,000 acres will be treated. Nearly 15,000 man-months of employment will be provided by this rate of planting. Conservative estimates indicate a need for planting 70 million acres in the United States. At the present rate of planting, it will take 70 years to complete the job. This rate of progress is too slow to expect early improvement of the economically depleted areas in which these lands are located for the most part. This program is authorized under Title IV of the 1956 Agricultural Act. It is designed to help the States accelerate forestation of non-Federal public lands and private lands. Approved State forestation plans propose the forestation of almost 1.2 million acres of State-owned forest land and other forestation work related to the production of improved seed, processing and nursery production in 33 States at an estimated cost of \$40 million. This program will help materially with improvement of the overall economic development of many rural areas. Furthermore, the Assistance to States for Tree Planting Program will furnish work opportunities that will supplement the objectives of the Economic Opportunity Act of 1964.

Examples of Recent Accomplishments

Figure W-1 shows progress for the fiscal years 1962-65.

During the fiscal year 1965 special technical and financial assistance is extended to the State of Kentucky to help with reforestation work on stripped mined areas. This will result in increased production of industrial wood and benefit soil conservation, watershed protection, wildlife habitat, and aesthetic and recreation values. The employment of local labor for this forestation work will immediately improve economic conditions for hundreds of people in a 19 county depressed area.

In Pennsylvania and other States special assistance is given to further a long-range forest tree improvement program. This includes test planting of hybrid and selected strains of trees in seed orchards. These areas will produce seed from tested superior trees that will provide planting stock with improved growth rate, quality, resistance to disease and insects.

THE REFORESTATION STORY, NON-FEDERAL LANDS UNDER
PROVISIONS OF TITLE IV OF THE AGRICULTURAL ACT OF 1956



	Reforested (through fiscal year 1964)				346,000 acres
	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	
No. of States participating	24	31	33	34	
State funds	\$1,564,000	\$2,430,000	\$2,500,000	\$2,500,000	est.
Federal funds	\$1,000,000	\$1,000,000	\$1,000,000	\$1,000,000	
Acres reforested	98,000	91,000	95,000	100,000	est.

Figure W - 1

ADMINISTRATIVE PROVISIONS, FOREST SERVICE

Changes in Language

Changes in the language of this item are proposed as follows. New language is underscored. Deleted matter is enclosed in brackets.

- 1 Appropriations [available] to the Forest Service for the current fiscal
year shall be available for: (a) purchase of not to exceed one hundred
2 and [twenty-nine] twenty-six passenger motor vehicles of which one
3 hundred and [fourteen] one shall be for replacement only, and hire of
such vehicles; operation and maintenance of aircraft and the purchase
of not to exceed six for replacement only; (b) employment pursuant to
the second sentence of section 706(a) of the Organic Act of 1944
4 (5 U.S.C. 574), [as amended by] and not to exceed \$50,000 for employ-
ment under section 15 of the Act of August 2, 1946 (5 U.S.C. 55a)
5 [,in an amount not to exceed \$25,000]; (c) uniforms, or allowances
therefor, as authorized by the Act of September 1, 1954, as amended
(5 U.S.C. 2131); (d) purchase, erection, and alteration of buildings
and other public improvements (5 U.S.C. 565a); (e) expenses of the
National Forest Reservation Commission as authorized by section 14
of the Act of March 1, 1911 (16 U.S.C. 514); and (f) acquisition of
land and interests therein for sites for administrative purposes,
pursuant to the Act of August 3, 1956 (7 U.S.C. 428a).

Except to provide materials required in or incident to research or
experimental work where no suitable domestic product is available,
no part of the funds appropriated to the Forest Service shall be ex-
pended in the purchase of twine manufactured from commodities or
materials produced outside of the United States.

Funds appropriated under this Act shall not be used for acquisition
of forest lands under the provisions of the Act approved March 1,
1911, as amended (16 U.S.C. 513-519, 521), where such land is not
within the boundaries of an established national forest or purchase
unit nor shall these lands be acquired without approval of the
local government concerned.

* * *

The first change would make it clear that the administrative provisions are
applicable only to those funds appropriated to the Forest Service and would
not apply to funds allocated to the Forest Service, such as Office of
Economic Opportunity.

The second and third changes would provide authority for the Forest Service
to purchase 126 passenger motor vehicles of which 101 will be replacements.
The justification of this need appears in the following pages.

The fourth and fifth changes would eliminate the limitation on the amount which would be used for temporary employment of persons and organizations by contract or otherwise, without regard to the Classification Act, and the dollar limitation would apply only to temporary employment of experts and consultants. As carried in the Appropriation Acts for a number of years, the dollar limitation has applied to both of the cited authorities.

This proposal is made to permit the Forest Service to contract for personal services whenever economical and advantageous to do so. There are in the Forest Service certain temporary personal service requirements which could most economically, efficiently, and expeditiously be performed by contract employment rather than by normal employment procedures. Examples are such personal service needs as fire lookouts, timber cruisers, timber scalers, recreation guards, livestock counters, switchboard operators, etc. In these jobs the work to be done is generally on a seasonal and intermittent basis, subject to circumstances beyond the control of the Forest Service -- i.e., fire hazard conditions and demands by timber sale operators, grazing permittees etc. -- which cannot be anticipated sufficiently in advance to permit full utilization of the employee's time. Under a contractual employment arrangement, the contractor would have great flexibility in assigning personnel to the job and better opportunities to utilize the time of such personnel not required on Forest Service work. This increased efficiency would result in economies to the Government as well as the contractor. The arrangement offers significant benefits. It eliminates initial and possibly replacement recruiting costs, training costs, and generally would provide better qualified personnel on short notice than would otherwise be available for part-time or short-term assignments. Also, the contractor assumes responsibility for payrolling his employees, maintaining related salary payment records, preparing related reports, and handling any possible injury or death claims.

Most employments by contract would involve persons or organizations located at or near the place where the services would be performed. Less time and travel would be involved. More expeditious handling of the job could be expected. An overall savings to the Government should be the end result.

The fourth change would also increase the dollar limitation for the temporary employment of experts and consultants from \$25,000 to \$50,000.

This proposed increase is needed to provide flexibility of operation in obtaining consultant services which are not available within the regular Forest Service organization. The number of studies requiring services of consultants has increased materially within the past few years. This increase is expected to continue, primarily as a result of expanding programs.

PASSENGER MOTOR VEHICLES

Purchase of passenger motor vehicles

During fiscal year 1966 it is proposed to replace 101 passenger cars, 9 of which are station wagons, all of which will meet replacement standards. It is also proposed to purchase 25 additional passenger cars. In some instances, due to actual program needs, it may be necessary to substitute a sedan for a station wagon or vice versa at the time orders are placed which could make a change in the relative number of sedans and station wagons shown, but this would not change the total number of passenger motor vehicles scheduled for replacement and addition.

Based on the planned schedule of replacements and purchase of additions, the Forest Service would have a total of 682 passenger vehicles, excluding 3 busses, in fiscal year 1965. On analysis of vehicle use and age pattern, the fleet is expected to include 101 units which will meet or exceed replacement standards before replacements are received.

As of June 30, 1964, the age and mileage classes of the Forest Service net active fleet exclusive of 3 busses were:

<u>Age Data</u>		<u>Mileage Data</u>	
<u>Year Model</u>	<u>No. of vehicles</u>	<u>Lifetime mileage</u>	<u>No. of vehicles</u>
1959 or older	53	60,000 to 79,999	55
1960	65	50,000 to 59,999	58
1961	92	40,000 to 49,999	77
1962	145	30,000 to 39,999	74
1963	165	20,000 to 29,999	129
1964	122	10,000 to 19,999	121
		1,000 to 9,999	128
Total	642	Total	642

Use of Vehicles

Passenger motor vehicles are used by (1) forest officers in the protection, utilization, management, and development of the National Forests and Land Utilization Projects and in the program for control of forest pests; (2) research technicians on experimental forests and ranges, on field research projects and forest surveys; (3) foresters engaged in carrying out the laws providing for State and private forestry cooperation; and (4) Regional Office field-going administrative personnel in performing, directing, and inspecting field work.

The Forest Service is essentially a field organization and its passenger motor vehicles are located mainly at Regional, National Forest, and Ranger District headquarters, and experimental forests and ranges. There are over 225 million acres within the exterior boundaries of the National Forests.

About 435 million acres of State and private forest land are included within the areas which benefit from Federal participation in the cooperative forest program. Much of this area is without common carrier service, and most forest areas and research centers are remote from commercial travel routes, requiring extensive use of motor vehicles as a means of transportation. The major portion of transportation needs, particularly at forest Regional and Supervisor levels and at other larger headquarters involves multiple passenger use and can be more expeditiously and economically met by use of sedans and station wagons than by other types of vehicles.

Justification of Replacements

Dependability of passenger vehicles is an important factor in keeping work programs on schedule and in meeting emergencies. Vehicle break-downs while on field travel cause disruptions and delays in field work as well as loss of effective work time of employees. The continued use of over-age equipment is undesirable from a safety standpoint since most of it is operated over rough, narrow, winding roads in mountainous country under adverse conditions. This use generally results in excessive operating and repair expenses when vehicles reach or exceed replacement standards.

In order to maintain passenger cars in a safe and satisfactory operating condition, it is the policy of the Forest Service to schedule periodic preventive maintenance inspections, services, and tune-ups to reduce the necessity for costly repairs and major overhauls, and to minimize lost time resulting from field breakdowns.

It is desirable to maintain a reasonable balance in the age class of the passenger vehicle inventory. The age class distribution is based upon conforming with replacement standards which recognize that some units will be retired under the age standard and others under the use standard. Prescribed replacement standards, although applicable, are not always appropriate for all Forest Service vehicles because of the wide range of operating conditions and the comparatively short field season in many of the National Forests at higher elevations. Decision on replacement of passenger vehicles which reach replacement age is based on an appraisal of each unit. This involves a review of the history record combined with a mechanical inspection of the vehicle's condition and repair liability. When such appraisal indicates that the vehicle is satisfactory for further service without unreasonable repair expenditures, it is retained and assigned to lighter work, even though such action tends to upset the age standards for the fleet inventory.

The vehicles selected for replacement are those which cannot be operated another season without excessive repair expense. They are unsatisfactory for further use both as to safety and mechanical condition. The replacement authorization requested is within the normal annual replacement standards prescribed by the General Services Administration (i.e., a maximum of 60,000 miles or 6 years, whichever occurs first).

Essentially all passenger vehicles are pooled for use by all activities with replacement of pooled units financed from a Working Capital Fund. All appropriations reimburse this fund in ratio to use of vehicles on activities financed by the respective appropriations.

None of the replacements requested will be assigned to areas served or scheduled to be served by Inter-Agency Motor Pools.

Justification of Additions

The Forest Service analyzes current work plans and programs in determining its overall passenger car requirements. This analysis includes a careful study of the number of vehicles needed at each field station, using as a guiding principle the ownership of only the minimum number of dependable units required to serve programs for which funds are budgeted. Also, it is Forest Service policy to utilize Inter-Agency Motor Pools or commercial car rental services to the fullest practicable extent. Passenger car use is restricted and is integrated with various activities so as to attain good utilization of all vehicles. Expanding activities in research, timber sales, public use of recreational facilities, fire protection, and other land management activities are increasing the need for more passenger cars. These increasing needs are being met in some areas through greater use of Inter-Agency Motor Pool vehicles. These pools, however, serve only very small parts of the total land area administered by the Forest Service; therefore, increasing requirements for passenger car transportation in several areas cannot be fully met except through purchase of additional units for the Forest Service fleet. None of the additions requested will be assigned to areas served or scheduled to be served by Inter-Agency Motor Pools.

Additions are financed from program funds in direct relationship to the anticipated use of the equipment. Distribution of costs to appropriations is based on analysis of use of the equipment fleet for the past three years and the estimated use for the budget year.

AIRCRAFT

Replacement and Addition of Aircraft

The 1966 estimates propose replacement of six aircraft by purchase and four by transfer from other agencies as available. The Forest Service currently has 57 aircraft:

- 11 - single-engine reconnaissance and transport airplanes
- 6 - light twin-engine reconnaissance and transport airplanes
- 14 - medium and heavy cargo and transport airplanes
(10 medium, 4 heavy)
- 23 - T-34B lead airplanes (2-place scout)
- 1 helicopter
- 2 forest spray airplanes (Pawnee and TBM)

The single and light twin-engine reconnaissance transport aircraft are used primarily to transport firefighters, smokejumpers, administrative personnel, equipment and supplies to remote and inaccessible areas where commercial service is inadequate, or not available for detection and suppression of forest fires. They are also used to locate and survey timber stand and vegetation conditions, such as insect infestations, blowdown, diseased areas, undesirable species, and to appraise resources and damage, and evaluate effectiveness of control.

The T-34B "lead" airplanes are used primarily by air tanker bosses to direct and control the dropping of fire retardants on forest fires by more than 150 tanker aircraft usually contracted from private owners.

The helicopter is used for training forest personnel in tactical use of helicopters and experimental development of techniques and equipment for direct tactical suppression of forest fires.

The six replacements requested will be single- and light twin-engine airplanes. They will be utility airplanes that may be used for several purposes, such as lead planes for air tankers, small paracargo dropping, reconnaissance, and transporting freight and passengers. These will be new standard manufactured airplanes to upgrade some old surplus T-34B's and single-engine reconnaissance airplanes which have reached an age in total number of flying hours where it is uneconomical to overhaul or modernize it to meet civil airworthiness requirements. These replacements will provide a more effective operation, with a wider safety margin. Forest Service aircraft are operated to a large extent over rough mountainous terrain where landing fields are poor and few. It is especially important that these aircraft be maintained for maximum performance and dependability to provide an adequate standard of safety.

Other aircraft currently in use may be replaced as newer and more suitable models and types become available from military services as excess property

They would be obtained on transfer without reimbursement and would not increase the fleet beyond 57 aircraft. When aircraft are partially or completely destroyed in a crash accident they may be replaced out of any available fund. The majority of current Forest Service aircraft were manufactured during World War II, and obtained from military surplus. Most of these planes have nearly reached their limit of useful age. The military services now have aircraft which have more potential suitability for Forest Service work that may become surplus in the near future. At present one medium cargo and personnel transport has reached the limit of economical usefulness.

(j) Roads and Trails for States, National Forests Fund

Appropriation, 1965 and base for 1966	\$13,141,263
Budget Estimate, 1966	<u>13,400,000</u>
Increase (due to an estimated increase in National Forest receipts in fiscal year 1965)	<u><u>258,737</u></u>

The permanent appropriation of 10% of National Forest receipts pursuant to the Act of March 4, 1913 (16 U.S.C. 501) is transferred to and merged with the annual appropriation for "Forest Roads and Trails." The explanation of the use of these funds is included in the justification for that appropriation item.

The increase of \$258,737 results from an estimated increase in receipts from sale of timber for fiscal year 1965.

(k) Expenses, Brush Disposal

Appropriation, 1965 and base for 1966	\$9,500,000
Budget Estimate, 1966	<u>9,500,000</u>

PROJECT STATEMENT

Project	: 1964	: 1965	: Increase or Decrease	: 1966
		:(estimated)	:(estimated)	:(estimated)
Brush disposal	:\$8,190,017	:\$9,000,000	: 500,000	:\$9,500,000
Unobligated balance brought forward	:-7,630,984	:-8,971,944	:-500,000	:-9,471,944
Unobligated balance carried forward	: 8,971,944	: 9,471,944	: - -	: 9,471,944
Total increased pay costs (P.L. 88-426)	: (- -)	: (258,000)	: (21,060)	: (279,060)
Total available or estimate	: 9,530,977	: 9,500,000	: - -	: 9,500,000

Timber cutting normally increases the fire hazard because of dry fuel increase in the form of logging slash. This slash may also contribute to the buildup of insect populations, increase certain disease infestations, and cause damage to stream channels.

National Forest timber sale contracts require treatment of debris from cutting operations or deposit of funds to pay for the work. When economical and expedient the work is performed by the timber purchaser. If it is not feasible for the purchaser to do the work, it is done by the Government using deposits made by the timber purchaser to cover costs of the work as authorized under Section 6 of the Act of April 24, 1950 (16 U.S.C. 490).

The effect of timber cutting and the manner of treating slash vary widely among Regions. In the three eastern Regions, volume cut per acre is relatively low, utilization is high, and generally, humid atmospheric conditions result in rapid decomposition of debris so little slash disposal work is necessary. An exception occurs in some sales where a heavier cut per acre is made, such as the jack pine stands of Minnesota. In such areas, slash is broken up and mixed with mineral soil by discing with heavy equipment. This reduces the hazard and provides a good seedbed to aid regeneration. Treatment of slash to prevent insect epidemics is sometimes necessary in these areas.

In contrast, the cost of slash abatement on most sale areas of the West is high. High volumes per acre generally produce heavy slash. Long dry periods with much lightning and man-caused fire risk result in extremely hazardous fire potential. The warm, humid condition necessary for rapid slash deterioration seldom occurs so more intense slash disposal is

required. Treatment varies greatly with different methods of cutting. Clear-cut areas are broadcast burned. In selectively cut areas, debris may be piled for burning over the whole area or in strips which serve as fire-breaks.

While slash disposal follows general prescriptions within Regions, individual needs of each sale offering are planned and appraised prior to advertisement and appropriate specific requirements are incorporated into each timber sale contract. In each instance the method used is the one which will attain adequate protection of the area at the least expense. In some instances adequate protection from fire is attained by providing additional protection until the slash hazard reverts to near normal. Logging debris which may move into water courses under these conditions must be removed. Greater intensity of fire protection for several years and occasional stream clearance may be less costly than complete slash disposal immediately after cutting. In such cases Brush Disposal funds are used to provide the needed manpower and facilities.

(1) Forest Fire Prevention

Appropriation, 1965 and base for 1966	\$25,000
Budget Estimate, 1966	<u>30,000</u>
Increase (representing estimated change in anticipated revenues)	<u><u>\$5,000</u></u>

PROJECT STATEMENT

Project	: 1964 :	: 1965 :	: Increase:	: 1966
		: (estimated)	: Decrease:	: (estimated)
Forest fire prevention	\$26,169:	\$32,000	: \$5,000:	\$37,000
Unobligated balance brought forward	: -16,900:	-44,316	: \$7,000:	-37,316
Unobligated balance carried forward	: 44,316:	37,316	: -7,000:	30,316
Total increased pay costs (P.L. 88-426)	: (- -):	(700)	: (- -):	(700)
Total available or estimate ...	: 53,586:	25,000	: \$5,000:	30,000

The purpose of the project is public education on the need for the prevention of man-caused wildfires on all the Nation's forests and range-lands. Its goal is the further reduction of man-caused forest fires on all ownerships to the point where their impact on natural resource management programs is negligible.

This project is accomplishing its purpose in two ways:

1. By the dissemination to the public of Smokey Bear's forest fire prevention messages on commercial products licensed by the Chief of the Forest Service.
2. By support of the Smokey Bear Junior Forest Rangers and of the Smokey Bear Awards program through the contribution of fees and royalties by licensees.

The Smokey Bear licensing program is an important part of the Cooperative Forest Fire Prevention Campaign which has been in effect for 23 years. The campaign itself has been conducted each year since 1942 as a cooperative project of the State Foresters and the Forest Service, United States Department of Agriculture, and is a public service program of the Advertising Council. The campaign utilizes the free public service resources of the various national advertising channels such as car cards, poster display systems, radio and television networks, and magazines and newspaper allocation plans in developing public cooperation in the prevention of man-caused forest fires. Since 1945, this campaign has been built around Smokey Bear who has become recognized and accepted by the public as a nationwide symbol of forest fire prevention.

Under authorization of Public Law 359 of the 82nd Congress, the Secretary of Agriculture has issued rules and regulations governing the licensing program. These licenses specify payment of royalties (usually 5%) and set up certain controls for administering the program and collecting the royalties including advance deposits to protect the Government's interest. Such collections, along with appropriated funds, are used to finance the Cooperative Forest Fire Prevention Campaign.

The licensing program provides about one-tenth of the total funds required for the Cooperative Forest Fire Prevention Program.

Examples of Recent Accomplishments

Unusually prolonged drought conditions coupled with heavy use of the wild-lands have required that special attention be given to preventing forest fires. Smokey Bear's message reached many millions of people during the past year.

Highlights of the Forest Fire Prevention Campaign:

1. Twenty-five and a half million Smokey Bear items were produced and distributed.
2. Radio kits were sent to 4,375 stations.
3. Television kits were sent to 700 stations.
4. Over two billion home impressions were made by Smokey Bear broadcast material. The estimated value of the air time contributed by broadcasters was more than \$10 million.
5. Newspapers and magazines donated space valued at \$3 million for Smokey Bear fire prevention messages. Approximately 128,000 "Smokey Says" one column newspaper cartoons were drawn and sent out to the nation's newspapers. This special feature was used weekly by an average of 2,500 newspapers in all parts of the United States.



BEFORE YOU START ANY FIRE:

- FOLLOW LOCAL REGULATIONS
- BE SURE FIRE CAN'T SPREAD
- DON'T BURN ON DRY, WINDY DAYS
- AND NEVER LEAVE FIRE UNATTENDED

PLEASE! Only you can prevent forest fires



PLEASE!



Only you can prevent forest fires

BEFORE YOU START ANY FIRE:

PLEASE!

- FOLLOW LOCAL REGULATIONS
- BE SURE FIRE CAN'T SPREAD
- DON'T BURN ON DRY, WINDY DAYS
- AND NEVER LEAVE FIRE UNATTENDED

Only you can prevent forest fires



(m) Restoration of Forest Lands and Improvements

Appropriation, 1965 and base for 1966	\$100,000
Budget Estimate, 1966	<u>100,000</u>

PROJECT STATEMENT

Project	:	1964	:	1965 (estimated)	:	Increase or decrease	:	1966 (estimated)
Restoration of forest lands and improvements	:	\$22,081	:	\$119,134	:	-\$19,134	:	\$100,000
Unobligated balance brought forward	:	-21,480	:	-19,134	:	+19,134	:	- -
Unobligated balance carried forward	:	19,134	:	- -	:	- -	:	- -
Total increased pay costs (P.L. 88-426)	:	(--)	:	(1,600)	:	(- -)	:	(1,600)
Total available or estimate..	:	19,735	:	100,000	:	- -	:	100,000

Recoveries from cash bonds or forfeitures under surety bonds by permittees or timber purchasers, who fail to complete performance, are used to complete improvement, protection, or rehabilitation work on lands under Forest Service administration. Funds received as settlement of a claim are used for improvement, protection, or rehabilitation made necessary by the action which led to the cash settlement, (Act of June 20, 1958, 16 U.S.C. 579c).

(n) Payment to Minnesota (Cook, Lake, and St. Louis Counties)
from the National Forests Fund

Appropriation, 1965 and base for 1966	\$137,763
Budget Estimate, 1966	<u>138,000</u>
Increase	<u>+237</u>

PROJECT STATEMENT

Project	: 1964	: 1965	: Increase	: 1966
	:	:(estimated):	:	:(estimated)
Payment to Minnesota	:	:	:	:
(total available or	:	:	:	:
estimate)	\$130,986	\$137,763	+\$237	\$138,000

The Act of June 22, 1948, as amended (16 U.S.C. 577c-577h) provides that the Secretary of the Treasury, upon certification of the Secretary of Agriculture, shall pay to the State of Minnesota at the close of each fiscal year an amount equivalent to three-fourths of one percent of the fair appraised value of certain National Forest lands in the counties of Cook, Lake, and St. Louis situated within the Superior National Forest. The Act further provides that payment to the State shall be distributed to each of these counties in conformity with the fair appraised value of such National Forest lands in each county.

(o) Payments to Counties, National Grasslands

Appropriation, 1965 and base for 1966	\$450,000
Budget Estimate, 1966	<u>450,000</u>

PROJECT STATEMENT

Project	1964	1965 (estimated)	1966 (estimated)
Payments to counties, National Grasslands (total available or estimated)	\$455,379	\$450,000	\$450,000

At the end of each calendar year, 25% of the revenues from the use of submarginal lands are paid to counties under the provisions of Title III of the Bankhead-Jones Farm Tenant Act, approved July 22, 1937 (7 U.S.C. 1012).

(p) Payments to School Funds, Arizona and New Mexico,
Act of June 20, 1910

Appropriation, 1965 and base for 1966	\$108,205
Budget Estimate, 1966	<u>110,000</u>
Increase (due to an estimated increase in National Forest receipts for fiscal year 1965)	<u>+1,795</u>

PROJECT STATEMENT

Project	: 1964	: 1965	: Increase	: 1966
	:	:(estimated):	:	:(estimated)
Payments to school funds	:	:	:	:
(total available or	:	:	:	:
estimate)	:\$100,413	: \$108,205	: +\$1,795	: \$110,000

Under provisions of the Act of June 20, 1910 (36 Stat. 562, 573) certain areas within National Forests were granted to the States for school purposes. The percentage that these lands are of the total National Forest area within the State is used in determining payments to the States. The receipts from all National Forest land within the State are used as the basis for applying the percentage. For example, if total receipts for the State are \$100,000 and if 10% of lands are in the "granted for school purposes" category, the payment to the State would be \$10,000. The amounts so paid are deducted from the net receipts before computing the 25% payments to States.

As soon after the close of the fiscal year as the receipts from National Forests and the area of school lands in the States of Arizona and New Mexico are determined, the payments are made to the States. Estimated payments in fiscal year 1965 to Arizona will be \$107,851 and to New Mexico \$354.

(q) Payments to States, National Forests Fund

Appropriation, 1965 and base for 1966	\$32,837,416
Budget Estimate, 1966	<u>33,540,000</u>
Increase (due to an estimated increase in National Forest receipts for fiscal year 1965)	<u>+702,584</u>

PROJECT STATEMENT

Project	:	1964	:	1965 :(estimated)	:	Increase	:	1966 :(estimated)
Payments to States	:	:	:	:	:	:	:	:
(total available	:	:	:	:	:	:	:	:
or estimate)	:	\$29,993,959	:	\$32,837,416	:	+\$702,584	:	\$33,540,000

The Act of May 23, 1908, as amended (16 U.S.C. 500) requires, with a few exceptions, that 25% of all money received from the National Forests during any fiscal year be paid to the States in which the forests are located, for the benefit of public schools and public roads of the county or counties in which such National Forests are situated. The amount of this appropriation varies each year in direct proportion to National Forest receipts during the previous fiscal year.

The amounts set aside from receipts collected for the sale of National Forest timber, grazing and special use permits, etc., before the 25% is applied are listed below:

1. Payment to the State of Minnesota covering certain National Forest lands in the Counties of Cook, Lake, and St. Louis situated within the Superior National Forest is made under the terms of the Act of June 22, 1948, Public Law 733. Receipts collected from the areas covered by this Act are excluded when the 25% payment to the State of Minnesota is computed.
2. For lands in certain counties in Utah, Nevada, and California, the States receive 25% of receipts only after funds, if made available by Congress, have been set aside for the acquisition of National Forest lands within the specified National Forests under the terms of special acts authorizing appropriations from forest receipts for this purpose.
3. Payments to the States of Arizona and New Mexico under the provisions of the Act of June 20, 1910, of shares of the gross receipts from the National Forests in those States which are proportionate to the areas of land granted to the States for school purposes within the National Forests.

(r) Working Capital Fund, Forest Service

This fund finances on a reimbursable basis various services such as repairing and replacing equipment, including aircraft, stocking and issuing supplies, operation of subsistence camps, operation of sign shops, photographic and reproduction facilities, and tree nurseries in support of programs of the Forest Service (16 U.S.C. 579b as amended). These service operations serve programs of fire protection, timber utilization, construction and maintenance of roads and other improvements, reforestation, grazing, watershed, forest and forest products research, and kindred conservation activities of the Forest Service, including cooperative assistance with other Federal agencies, States, counties, and individuals engaged in the same objectives.

Operating results and financial condition. Government investment in the fund as of June 30, 1964, including donated assets and retained earnings for fiscal year 1964, is \$31,141 thousand. By the end of 1966 the investment is anticipated to be \$36,408 thousand, an increase of \$5,267 thousand which represents estimated earnings and donations during 1965 and 1966.

Receipts, non-operating income, and retained earnings include an estimated \$3,558 thousand as of June 30, 1966, identified as income provision for increased cost of equipment replacements to be used only for financing the increased cost of equipment replacement, i.e., the difference between the cost of the replacement unit and the cost at the time of acquisition of the unit being replaced. This increased cost is due to inflation and model improvement, and must be financed if the fleet strength is to be maintained and not depleted through the gradual attrition of price increases for replacements. The earnings for the provision for increased cost of replacements are derived from a factor which is included for this purpose in rental rates charged to program appropriations for equipment use and credited to the Working Capital Fund.

Retained earnings as of June 30, 1966, will total an estimated \$7,300 thousand which will consist of \$2,657 thousand gain on sale of equipment, \$1,085 thousand profit from operations, and \$3,558 thousand for provision for increased cost of replacement of equipment. Retained earnings have been applied toward increased cost of equipment replacements, purchase of fleet additions, and to furnish adequate working capital.

(s) Cooperative Work, Forest Service (Trust Fund)

Contributions are received from cooperators, including counties, States, timber sale operators, individuals, and associations, and are expended by the Forest Service in accordance with the terms of the applicable cooperative agreements. The work consists of protection and improvement of the National Forests, work performed for National Forest users, and forest investigations and protection, reforestation, and administration of private forest lands.

The major programs conducted under the account "Cooperative Work, Forest Service" are described below in terms of the projects reflected in the statement at the end of this section.

1. Construction and Maintenance of Roads and Trails, and
2. Construction and Maintenance of Other Improvements:

Under the Acts of June 30, 1914 (16 U.S.C. 498) and March 3, 1925 and April 24, 1950 (16 U.S.C. 572) deposits for cooperative work are accepted from State and local government agencies, associations, Federal timber purchasers, and others for the construction and maintenance of roads, trails, and other improvements and for performing work which is the National Forest users' responsibility, this method of performance of the work being of mutual benefit or of benefit to the public at large. Cooperative deposits received for wildlife habitat improvement for States from their hunting and fishing fees are included in this activity.

3. Protection of National Forest and Adjacent Private Lands: The Act of June 30 1914 (16 U.S.C. 498) authorizes the acceptance of deposits for the protection of the National Forests and the Act of March 3, 1925, as amended by Section 5, Act of April 24, 1950 (16 U.S.C. 572), authorizes the acceptance of contributions for the protection of private lands in or near the National Forests. The major portion of the obligations is for the protection of private lands from fire. This arrangement helps both parties since there are millions of acres of private forest land intermingled with Federal ownership on the National Forests. The lands in private ownership are usually in small tracts. It would be uneconomical for the owner to set up a fire control organization for the protection of his land. The advantage to the Government is that in many cases it would be necessary to suppress the fires on the private land without reimbursement in order to protect the adjoining Federal land.
4. Sale Area Betterment (including reforestation): Section 3 of the Act of June 9, 1930 (16 U.S.C. 576b) provides for deposits of funds by timber sale purchasers to cover the cost of reforestation and special cultural measures to improve the future stand of timber on the areas cutover by the purchaser. Deposits in fiscal year 1964 under this authorization totaled \$19.9 million. Fiscal year 1964 accomplishments under this program are reported under the Forest Land Management subappropriation along with accomplishments for reforestation and stand improvement for that subappropriation.

5. Scaling: Under provisions of the Act of April 24, 1950 (16 U.S.C. 572) and of Section 210 of the Act of September 21, 1944 (16 U.S.C. 572a) acceptance of deposits from timber purchasers for cooperative scaling service is authorized. Such arrangements are established only when requested by the operator and when the operator pays the extra cost of such services.

Subsection (c), section 5, Act of April 24, 1950 (16 U.S.C. 572) provides broad authority to reimburse appropriations initially charged for expenses for cooperative services performed. The justification given in requesting this authority in the legislative history in House Report 1189 and Senate Report 1069, 81st Congress is limited to emergency situations. It would be convenient and economical to use this broad authority to furnish cooperative scaling services to timber purchasers by charging appropriations available for this type of work. Collections would be made later from the purchaser whenever he has arranged to pay for stumpage and other related charges after such charges have been determined. Comptroller General's Decision B-150466 dated January 14, 1963 clarified the authority in section 5 of the Act of April 24, 1950 (64 Stat. 82, 16 U.S.C. 572) to make collections in arrears for elective cooperative deposits related to timber sales applicable to payment bond procedures. In summary, the Comptroller General stated that he would have no legal objections to the Forest Service rendering services authorized by section 5 on a reimbursable basis in instances where: (1) it has been administratively determined to be advantageous to the Government, and (2) necessary precautions have been taken to insure the recovery of all costs involved, including payment bond procedures; Provided: (1) deposits to appropriations do not exceed the amount of costs incurred, and (2) appropriate congressional committees be advised of our plans to use section 5c in situations other than the emergencies contemplated by the Congress at the time the law was enacted. Beginning in fiscal year 1964, the Forest Service used this procedure when appropriate.

6. Research Investigations: The Acts of June 30, 1914 (16 U.S.C. 498) and May 22, 1928 (16 U.S.C. 581i-1) authorize the acceptance of deposits for forestry research. Deposits are received from State and other public agencies, and from industrial, association, and other private agencies to finance research projects of mutual interest and benefit to both parties. The deposits may be made either in a single sum or on a continuing basis, and may either partially or wholly cover the cost of the research. The cooperative research projects may involve any aspect of forestry and vary widely as to scope and duration. A very common example of such cooperation is for a State to make a deposit to the cooperative work fund in order to intensify or to speed up completion of a comprehensive survey of the forest resources of the State. Other examples are State contributions toward forest fire research. The results of such cooperative investigations are made available to the general public as well as to the depositor.

7. Administration of Private Lands: The Act of March 3, 1925, as amended by Section 5, Act of April 24, 1950 (16 U.S.C. 572) authorizes the acceptance of contributions for the management of private lands. These contributions are made by private owners having land intermingled with or adjacent to National Forests who wish these lands managed in accordance with good forest management practices. Their holdings are usually too small to warrant the employment of professional foresters to administer such tracts. The advantages to the Government include the avoidance of possible high fire hazard areas resulting from improper cutting practices, the elimination of the necessity of precisely marking the boundaries of the private land, and additional private forest land handled under proper forest practices.
8. Reforestation (private lands): The Act of March 3, 1925, as amended by Section 5, Act of April 24, 1950 (16 U.S.C. 572) authorizes the acceptance of contributions for reforestation of private lands situated within or near a National Forest. This work is limited to areas of private land within a planting project on the National Forests or to areas in which certain civic and other public-spirited organizations have taken an interest.
9. Statement on Utilization of Funds: Following is a statement of funds received and obligated and balances available by major activities:

Project	Actual Fiscal Year 1964			Estimate Fiscal Year 1965			Estimate Fiscal Year 1966		
	Balance Available June 30, 1963:	Funds Received	Obligations	Balance	Funds Received	Obligations	Balance	Funds Received	Obligations
1. Construction and maintenance of roads and trails	\$871,829	\$1,486,191	\$1,526,860	\$831,160	\$1,490,000	\$1,490,000	\$831,160	\$1,400,000	\$1,400,000
2. Construction and maintenance of other improvements a/	522,897	763,206	725,208	560,895	765,000	750,000	575,895	750,000	750,000
3. Protection on National Forests and adjacent private land:	466,189	2,023,981	1,969,008	521,162	2,025,000	2,025,000	521,162	2,025,000	2,025,000
(a) Fire									
(b) Other	1,204,060	1,484,159	1,264,954	1,423,265	1,500,000	1,500,000	1,423,265	1,500,000	1,500,000
4. Sale area betterment on National Forest lands (including reforestation)	24,475,528	19,914,466	16,205,158	28,184,836	20,419,000	15,930,000	32,673,836	21,545,000	20,545,000
5. Scaling of timber	230,980	831,271	795,072	267,179	835,000	835,000	267,179	835,000	835,000
6. Research investigations	346,270	915,723	977,734	284,259	920,000	920,000	284,259	900,000	900,000
7. Administration of private lands	15,401	6,138	11,764	9,775	6,000	10,000	5,775	5,000	5,000
8. Reforestation (private lands) .	92,139	39,559	40,767	90,931	40,000	40,000	90,931	40,000	40,000
Subtotal	28,225,293	27,464,694	23,516,525	32,173,462	28,000,000	23,500,000	36,673,462	29,000,000	28,000,000
Advanced to FOREST PROTECTION AND UTILIZATION for fighting forest fires	-1,400,000		-1,400,000						
Total	26,825,293	27,464,694	22,116,525	32,173,462	28,000,000	23,500,000	36,673,462	29,000,000	28,000,000

a/ Includes approximately \$130,000 State hunting and fishing cooperative deposits.

b/ Reflects obligations in 1963 for fighting forest fires which were recovered from the 1964 appropriation for fighting forest fires.

c/ Includes \$4,358 reimbursed to appropriation.

NOTE: Balances carried forward are due primarily to necessity of deferring work for which funds are deposited until the most practicable time. For instance, funds for sale area betterment are received in advance of cutting, but work cannot be started until cutting operations are completed. The time lag sometimes extends for several years, depending on the amount of preparatory work required in the sale area, weather conditions, etc.

Above obligations for 1964 include:

(1) Transfers to National Forests Fund of earned sale area betterment deposits in excess of obligations for sale area betterment work	\$143,366
(2) Refunds to cooperators	213,396
	356,762

